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DEVELOPMENT OF SWAMP LAND AT RUAKURA.

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THE swamp area at Ruakura, references to which have appeared from time to time in the *Journal*, is situated on the fringe of the great expanse known in general as the Piako Swamp. The land in the rough is typical of considerable areas of more or less unreclaimed country which is being taken in hand by settlers. Our experience at Ruakura in developing this class of swamp land should therefore prove useful to many farmers, and the object of these notes is to present the latest information regarding its treatment. The methods outlined are not merely present-day suggestions; they have been put into practice, and, from the results achieved, they may be relied upon to effect definite and substantial improvements.

Those who have had experience with these swamp soils will agree that draining and stumping are not the most difficult propositions. To get anything useful to grow after this preliminary work is completed is undeniably the greatest problem, and it is here that many farmers will benefit by advice. It has been only too often demonstrated that once land of this nature is broken up with the plough

sorrel takes possession, and spurrey in the lower-lying places. Repeated ploughing, disking, and cultivating fail to rid the ground of sorrel, besides entailing considerable expense. Little success has attended the sowing of ordinary cover-crops to smother out weeds, for the crops which will succeed on this land are few in number. The effect of repeated ploughing and cultivation during the first stages of development is undoubtedly detrimental.

PORTION OF SWAMP AREA AT RUAKURA.

This piece of land (previously open-drained with other parts of the area) was stumped during the past spring. The logs shown were hauled out with the Trewhella monkey-winch.

The problem at Ruakura is complicated by the fairly general "waterproof" nature of the swamp soil,* though this feature is far more pronounced in certain patches, particularly where logs are or have been lying most thickly. Soil of this nature is composed chiefly of rotten timber, decayed rushes, manuka, and fern, and during dry weather will burn. When once thoroughly dry the ground will not absorb moisture, and after heavy rains pools of water will lie on the surface for days without soaking in. Plant-life thus withers up and

* This subject was treated by Mr. B. C. Aston, Chemist to the Department, in an article entitled "Waterproof and Wax-bearing Soils," published in the *Journal* for October, 1916. Mr. Aston described the sample examined by him as a humus soil rich in available mineral plant-food, and found the loss on ignition to be 34·74 per cent.

dies. How many of us who have land of this nature to deal with have sown turnips and swedes and failed to get a crop; have sown peas, vetches and maize, barley and oats, and reaped nothing but a splendid crop of sorrel!

The problem must therefore be tackled by methods other than repeated cultivation. As indicated, enough investigation and experimental work has been done at Ruakura to furnish reliable information regarding the procedure, and the pastures now to be seen on the last fields won from the swamp bear evidence of the success of the practice. The methods to be adopted may be summarized as follows:—

Reduce ploughing and cultivation to a minimum right from the commencement.

Crowd out sorrel and swamp weeds by sowing Western Wolths rye-grass in autumn.

Consolidate and manure by heavy stocking, preferably with cattle.

Maintain the stock on the rye-grass as long as possible by carting out feed during the winter.

Chain-harrow frequently while stocking.

Surface-sow clovers and *Lotus major* during the following spring, and at the same time run the hay-mower over the field to cut down any sorrel-seed.

Apply lime as a top-dressing, and use alkaline manures.

Before proceeding further it may be well to state that in the preliminary operations open drains dug as deep as possible will give best results at first. Field tiles should not be laid until the land is consolidated. For stumping, a Trewhella monkey-winch will be found of great assistance, particularly when dealing with large areas and where heavy stumps are to be handled. This winch is in use at Ruakura, and has given entire satisfaction. The land should be worked up as well as conditions will allow, either with a heavy swamp-harrow, disk, or plough, and sown down with a heavy seeding of Western Wolths rye-grass.

In cases where the land has already been ploughed, and is now infested with sorrel, plough in February, roll on furrow, disk, and harrow. Roll again before sowing the seed, in order to consolidate the land as much as possible, cover with brush harrow, and finish with the roller.

The most opportune time to sow Western Wolths rye-grass is in the early autumn, immediately following the first rains. Moisture and temperature of the soil at the time of sowing will influence the result by encouraging or retarding germination, even to such an extent as to be the deciding factor between success and failure. Should the soil be dry and dusty, delay sowing until further rains. Sow

during the first week in March if possible, as the grass will then make good growth before frosts occur. Seasonal growth which might be expected to follow March sowing, and rainfall and frost, are details of far-reaching practical importance.

Autumn sowing has many advantages over spring sowing. Spring-sown rye-grass runs to seed during the first summer, and should dry weather be experienced the roots die out after seeding. When autumn-sown, rye-grass plants develop a stronger root-system and produce heavier leafage, and are thus better able to crowd out

PART OF A 13 ACRE FIELD IN RYE-GRASS AND WHITE CLOVER AT RUAKURA, KNOWN IN 1915 AS THE ' SORREL-PADDOCK."

the sorrel. Sorrel is less vigorous in autumn than in spring, and in October, when growth commences, the rye-grass is then well established, and will be able to smother out the weeds. Autumn-sown rye-grass provides excellent winter feed for stock, stands heavy stocking during the period when mangels and hay are being fed, and produces a mat of surface roots which prevents the land poaching up to any great extent.

Consolidating and manuring by heavy stocking is of vital importance in the breaking-in process, and good results can only be obtained from the application of sound methods of management. The first and second feeding should be done with sheep. Turn on a large

mob, and remove them in time to avoid hard grazing. Stocking should then be confined to cattle until the following summer. Feed out hay, straw, mangels, turnips, and swedes to maintain the stock there as long as possible. By feeding hay containing white clover, seed will be carried on to the swamp area, and the clover will establish itself. The seed of white clover passes through cattle unharmed, and the manure is spread evenly over the field by chain-harrowing.

One of the best fields of white clover at Ruakura was established under these methods. It was autumn-sown with 20 lb. per acre of

IN ANOTHER 12-ACRE FIELD OF WESTERN WOLTHS RYE-GRASS AND RED AND WHITE CLOVER, WHICH TWO YEARS AGO WAS NOTHING MORE THAN A SORREL AREA.

Western Wolths rye-grass broadcasted. The manure applied consisted of 1 cwt. basic super, 1 cwt. Seychelles Island guano, and 1 cwt. Ephos phosphate per acre. White-clover hay was fed to stock during the winter months, and the field chain-harrowed. Two years ago this was a field of sorrel, being known, indeed, as the "sorrel-paddock."

After the land has been well consolidated with stock, clover-seed surface-sown about the end of September will give excellent results. Sow 10 lb. red clover, 2 lb. alsike, 1 lb. white clover, and 1 lb. *Lotus major* per acre. Close from stock for at least one month after sowing. Sorrel-heads may appear at this season of the year,

and it is advisable to run the mower over the field before the seed sets, thus preventing seeding.

In placing this development scheme before readers I am aware of the difficulty which some farmers would have in providing and carting out feed to the stock during winter. This difficulty would be accentuated in cases where the whole of the farm was swamp. However, once a little progress is made, a continuation of the advance will characterize each successive year. The previous year's work will assist with that of the current year, and each pasture addition will increase the carrying-capacity of the farm.

USE OF SULPHUR IN AGRICULTURE.

It does not appear to be generally known that with many soils wonderful results may be obtained by a dressing of powdered sulphur at the rate of from 300 lb. to 400 lb. per acre. According to experiments made in Utah by the American Smelting and Refining Company, treatment with elemental sulphur at the rate of 400 lb. per acre increased the barley-yield 52·6 per cent., the oat-yield 57·3 per cent., the wheat-yield 127·8 per cent., the maize-yield (variety Milo) 182·6 per cent., the potato-yield 63 per cent., and the yield of peas no less than 383·3 per cent. Substantial increases were also obtained with other crops. Treatment with sulphuric acid equivalent to 400 lb. of sulphur per acre gave similar but on the whole lower results. Probably the experiments were made on a soil containing free alkali, and therefore peculiarly suited to the sulphur or acid treatment; but experimental work in other parts of the United States shows the value of sulphur as a fertilizer for many classes of soil, particularly when leguminous crops, such as peas, beans, clover, lucerne, &c., are being grown. For instance, in some tests made in southern Oregon, a 500-per-cent. increase in the alfalfa cut was obtained by harrowing 300 lb. of raw sulphur into each acre. Much experimental work remains to be done in order to determine the exact value of sulphur as a fertilizer, but its addition to the soil is known to promote the liberation of potash and the nitrification of the soil. Moreover, it has been ascertained in recent years that sulphur is much more important as a plant-food and a plant-constituent than was formerly supposed.

Dr. C. B. Lipman, of the Agricultural Experimental Station, University of California, has shown that remarkably successful results follow the sprinkling of strong sulphuric acid at the rate of 1 to 3 tons per acre on alkali soils. It is possible that such a treatment, followed by the application of lime, may be useful in some parts of New Zealand. It is certain that the bold conception of the use of a strong mineral acid, first made, or at least first practically tested, in California, will bear important results in regions with arid soils, such as those of North and South Africa, Persia, parts of India, parts of Australia, &c.—*P. G. Morgan, in Annual Report of New Zealand Geological Survey, 1917.*

DEHORNING OF CATTLE.

A. R. YOUNG, M.R.C.V.S., Veterinary Supervisor, Wellington.

IT is claimed by the advocates for dehorning cattle (1) that a herd of cows settle down better after dehorning, thereby increasing the quantity and quality of the milk-yield to an appreciable degree; (2) that a large amount of bruising, especially in fat stock sent for slaughter, would be avoided by it; (3) that horned cattle inflict unnecessary cruelty upon each other; and (4) that many fatalities to human beings would be prevented by dehorning.

The first two arguments cannot be considered upon their merits alone, as dehorning adult cattle solely for the sake of profit to the owner would be an act of cruelty which could not be recommended from that viewpoint. Neither does the writer favour compulsory or indiscriminate dehorning, for there are many herds where the docility is such as to make this operation unnecessary. The same may be said of single animals whose timidity of nature prevents them from using their horns as an offensive weapon. There is also the question of purebred animals appearing in the show-ring complete according to their breed. When dehorned these cattle would lose their characteristic expression.

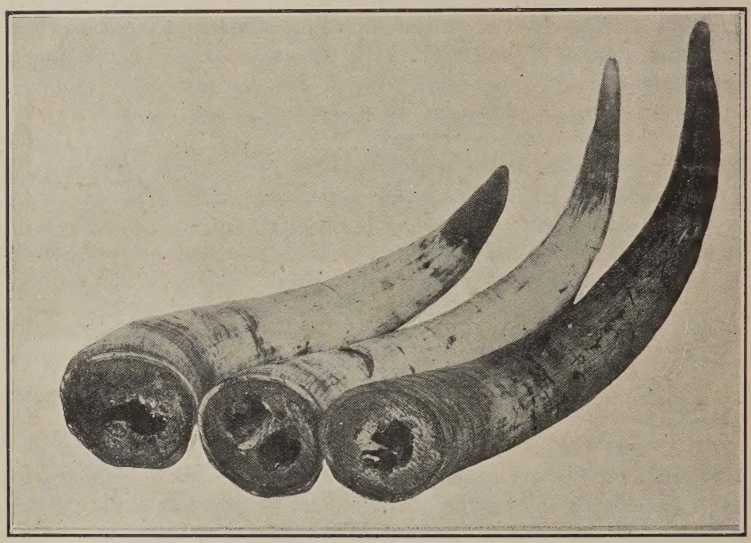
We have ample evidence, however, of horned cattle cruelly attacking each other, and also often causing serious injury and sometimes death to humans. The matter of this article is therefore advanced in the spirit of assisting stockowners who desire to prevent such occurrences.

Before dealing with the methods of dehorning, the horn itself may be briefly described. The horn is composed of two parts: the true horn, or outer shell, which is a non-sensitive structure like the human finger-nails, and the core, or inner structure, which is very sensitive, like the quick underneath the nail, but, unlike the latter, consists of bone freely covered with nerves and blood-vessels which supply the outer covering with its nutriment and also act as a strong support to it. This core is hollow for a considerable extent of its structure, the hollow, or sinus, commencing in the bones of the head and being prolonged well up the horn. The sinus is fairly large, and is often divided into two, and may exceed 1 in. in diameter. This offers, after dehorning, facilities for the access of dirt into the head, where there would be no outlet for the suppuration which would subsequently

form there and give considerable trouble to get rid of. Its presence there would also cause the animal great pain, as evidenced by constant shaking of the head, holding it to one side, and rubbing it against something which, instead of relieving the animal, may contribute more dirt.

HORN-PREVENTION IN CALVES.

In calves the undeveloped horn can be felt as a small round body loosely attached to the head just underneath the skin, and resembling a button. When this is felt, as it generally can be when the animal



HORNS SAWN OFF, SHOWING HOLLOWS.

The horn on left has been removed 3 in., that in middle 2 in., and the one on right 1½ in. from the head.

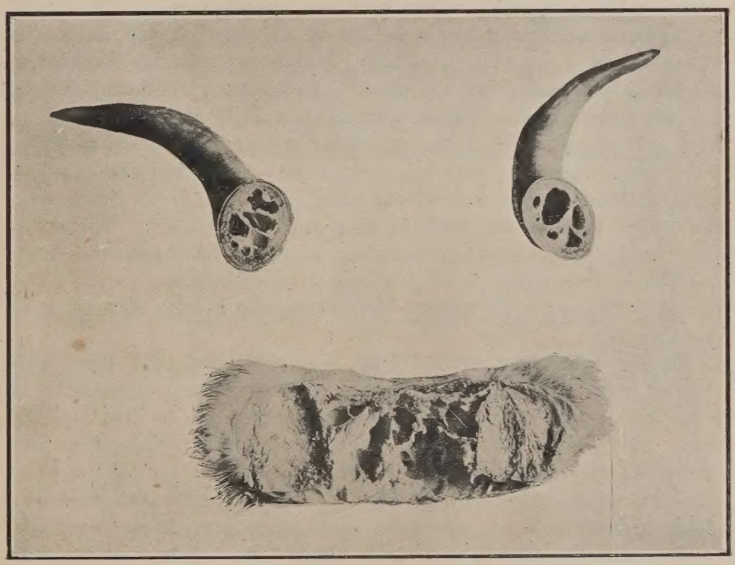
is a week old, is the best time to dehorn, and by the most humane method.

The procedure is as follows: First secure a supply of caustic potash in stick form. Clip all the hair from off the part to be operated upon, then brush or wash and dry, so as to remove all dirt. Next moisten the end of the stick of caustic in water, taking care to keep the fingers protected from contact, and rub gently all over the button only. The caustic penetrates through the skin and destroys the outer covering of the budding horn, thereby interfering with its nourishment and subsequent development. This operation should not be attempted in wet weather, as dampness interferes with the caustic in its local

action, and has a tendency to make the application spread beyond the part to which it was applied.

After-treatment is not required, but the animals should be periodically examined to see whether the operation has been successful. If not, it can be repeated after the scurf has been effectually removed.

Another method for dehorning calves, which is sometimes employed in cases of calves developing horns in a breed which should be hornless, is to clip the hair from off the "bud" and wash and disinfect



HORNS REMOVED HALF AN INCH FROM THE HEAD.

Showing sinuses (hollows) which are directly connected with those to be seen in frontal part of skull be'ow.

the part. A sharp knife is then used to cut an incision through the skin sufficiently large to admit of a small sharp gouge, with which the bud is scooped out. The skin heals very quickly, and the scar is very difficult to detect once the hair has grown.

DEHORNING OF ADULT CATTLE.

The best time to dehorn adult cattle is in cold weather, when there are fewer flies about to "blow" the stump than would be the case in summer. For cows the most suitable time is when they are about dry and not far advanced in pregnancy. If heavy in calf there is always a danger of them aborting, due to the excitement or crushing.

The operation of dehorning can be performed with a pair of specially made shears, but as these are clumsy to handle and, when the horn is old, have a tendency to fracture the base of the horn remaining upon the head, which would cause bad after-effects, a good bone-saw is preferable. This is a very handy instrument, and a little practice will soon make one expert enough to do the work quickly and neatly. In selecting a saw get one deep enough to go through a large horn without the back coming into contact with the horn, otherwise a clean-cut under-surface will not be obtained. No grease or oil is required, as the horn will provide this.

When a number of cattle are to be dehorned it will be to the advantage of the operator to make special arrangements for holding animals while being operated upon. An ordinary race can be used for this purpose, with certain alterations to the breast-bars, one to have a U-shaped notch in the centre big enough to hold the windpipe and gullet. This prevents injury to these parts when the top bar, which is fixed upon a bolt at one end, is brought firmly down upon the upper part of the neck to keep the head steady. The cross-bars behind should be arranged to firmly press upon the hind-quarters of the animal, so that it cannot move backwards even a few inches. This saves the fingers of the operator, as also his saw, from damage.

Having everything satisfactorily fixed up, grasp the horn with the left hand, and, after selecting the part where the dehorning is to take place, begin to saw quietly until a tract has been made for the saw. There is no pain at this stage, as only the non-sensitive part of the horn is being gone into. Then drive quickly, but do not press the horn downwards more than just enough to relieve the saw, as a clean underneath cut is desirable. The other horn is now similarly treated, and the animal yarded for observation. Where only a bull is to be subjected to dehorning, this can be done by securely fixing him to a tree, and using the saw in the same manner.

The correct distance from the head to take off a horn is 1½ in. If cut shorter than this a very large hole is left exposed on the head; if longer, the animal will still find a use for the stump as an offensive weapon.*

The operation being finished the yarded animals should be examined, and any case of excessive bleeding attended to by the application of tar. After-treatment is seldom required unless in hot weather, when, in all cases, tar should be applied to the stump. Where it is found that dirt has got into the head, causing suppuration,

* The thrust of a horn often ruptures a small blood-vessel underneath the skin of the victim, causing a large lump filled with blood to form. This if left alone will get absorbed in time, but bathing or rubbing does more harm than good, as it slackens the skin and allows the bleeding to extend more freely. It is best not to open the lump unless pus forms.

the cavity should be syringed out with water to which has been added some disinfectant.

OBSERVATIONS.

In milking-herds the result of the dehorning operation has been observed by the writer in ten thousand cases. None of the animals died as a result, three slipped their calf, and a few delayed healing up. The milk-supply dropped on average 3 lb. the first day, regained 2 lb. the second day, and was back to normal the third day. There is no record of a subsequent additional quantity or quality of milk due to dehorning, only a general remark that the loss was more than made up, so that no definite information can be given upon this point. If, however, general observation is to count for anything, many dairymen dehorning their cows several years ago have not continued the practice—the writer is not able to state why. There is no doubt about the efficacy of dehorning for the prevention of cruelty and injuries.

SEED-GROWING FOR NEW ZEALAND.

THE QUESTION OF REGULATIONS.

A. H. COCKAYNE, Biologist.

SEED-GROWING may be divided into two main classes—general seed-growing and special seed-growing. In general seed-growing no particular attention is paid to the exact origin of the seed, but in special seed-growing trueness to type or strain is more essential than anything else. This trueness to type is a simple matter with regard to seeds that are self-fertilized, such as wheat, for instance, and the only thing that has then to be attended to is the roguing of the crop to get rid of other strains that may appear accidentally and the seed of which cannot be satisfactorily dressed out.

With plants that require to be pollinated either by insects or the wind, and of which there are various strains, the difficulty of production is greatly increased. Special efforts have to be made to avoid the introduction of foreign pollen. There are, of course, many insect- and wind-pollinated plants with which this is not necessary—for instance, with red clover—but in such cases one is not dealing with actual strains or agricultural varieties. The main special seeds with which precautions against foreign pollination have to be taken are all members of the Brassica family—turnips, rape, and swedes—and those of the mangel family.

In Europe the method adopted is to grow only one single variety in any particular locality, but the distance apart each strain has to be kept is not great, one mile, for instance, being generally considered enough for any of our agricultural plants. In any one locality there may be many growers each growing only the one variety that blooms at the same time.

The growing of special seeds in Europe may in itself be divided into two sections. First of all there is the growing of limited quantities of what may be termed mother or pedigree seed. This is carried out with the utmost care, both with regard to selection of parent plants and in the control of pollination. The pedigree seed thus obtained each year is supplied to reliable and experienced growers, and the seed produced is the ordinary commercial seed of commerce. The mother-seed growers are generally controlled by seed-merchants, or are special organizations such as seed associations. The pedigree seed is generally grown on contract at a certain price per pound or bushel, as the case may be. A very similar system to this is in vogue in New Zealand with regard to garden-pea growing. The seed-merchant or organization interested in the growing of the pedigree seed on a commercial basis naturally takes care to have the pedigree seed grown under the most favourable conditions, and does not allow two varieties likely to cross-fertilize to be grown close together. The same care, however, is not taken to avoid cross-pollination as in the production of the mother seed.

So far as the writer is aware, there are no regulations in Great Britain regarding the actual growing of seeds. If there are, they must be of very recent origin. In Europe generally prior to the war there were no cultural restrictions in seed-production. The regulation of marketing, however, was in vogue in certain instances. Before detailing any suggestions as to regulations in New Zealand for growing special seeds some account may be given of the possibilities of special seed-growing in the Dominion.

SPECIAL SEED-GROWING FOR NEW ZEALAND.

The first question that arises when considering this matter is whether any fostering and regulation of the production of special agricultural seeds should be looked upon as temporary or permanent. In other words, are any regulations to be regarded as war expediencies, or are they to be looked upon as safeguards tending towards the establishment of a permanent agricultural industry? The difficulty, of course, is that, if temporary, one does not know for how long, as everything depends on the duration of the war and the unsettled period that may follow. This period may be quite a long one, and

it is clear that even at the present time the difficulty of securing adequate supplies of those seeds requiring great care in their production is acute. It is quite likely that prices for such seeds will remain high for some time after hostilities have ceased

This point of high prices is an important one, which requires some explanation. Before the war the two great groups of agricultural-seed middlemen—namely, the English and German seed-merchants—had at their command an abundance of efficient and cheap labour available for the production of seeds requiring skilled management. At that period Europe was able to supply specially grown seeds at a remarkably low price—at a price, in fact, that made it economically unsound for New Zealand to produce her own requirements. In other words, intensive seed-production did not pay, faced as it was with the free competition of outside suppliers. The intensive production of local seeds had been attempted and the pecuniary results were not encouraging.

Again, with regard to extensively grown general agricultural seeds, the high prices realized by other soil-products were even before the war making such seed-growing an uneconomic proposition. Just prior to the war there was every indication that the greater part of seed-raising in New Zealand, with the exception of cereals, was doomed. Danish cocksfoot, Irish rye-grass, German red clover, and Russian white clover were all underselling our locally grown seeds, and the inducement to produce them locally was yearly lessening. At the present time New Zealand is short of future requirements for both her extensively and intensively grown crops, and the high prices ranging make seed-growing of any description highly remunerative.

The possibility of high prices being quite temporary, however, acts as a sharp deterrent against the establishment of special seed-growing. The expenses in connection with it, especially those of skilled labour, are so great in New Zealand that unless high prices can be guaranteed for a considerable number of years no one would embark on the enterprise. Further, there is a very considerable prejudice against locally produced special seeds, due to the fact that in the past, through lack of knowledge, seed vastly inferior to that imported has been produced from time to time in New Zealand. There have, of course, been notable exceptions. As soon as cheap reliable European seed is again on the market it is only natural that it should soon oust locally produced seed. Any special seed industry that had been established would rapidly decline unless backed by the most drastic import restrictions.

Thus, unless supported by a large measure of protection, it is unlikely that special seed-growing will become in New Zealand a

permanent industry. It, however, seems highly desirable that for the next two years at least provision should be made here to grow a certain proportion of the required special seeds, and then abandon the practice later on. One of the reasons for this is that there should be no difficulty in keeping up the quality of the strains for a short period. When a strain has to be kept up to standard permanently the matter is very different, and in Europe specially skilled growers devote themselves to the production of the actual pedigree seed, which is sent to other growers to produce seed with on a commercial scale. If special seed-growing is adopted here only temporarily, then the necessity for producing mother seed from season to season is obviated. This greatly reduces the difficulties and expense. For two or even three seasons, at any rate, we can sow each season imported seed that is known to be fairly true to type, and which has already been imported, and locally produced seed from it can be used for ordinary crop purposes but not for fresh seed-production.

SUGGESTIONS.

Personally I do not think any regulations are necessary for the control of the growing of special seeds. The contract system is almost certainly the one that would be adopted. The merchant will naturally see to it that two varieties likely to cross-pollinate are not grown close together, and it is quite unlikely that two different seed-merchants will be having seed grown for them in the same locality. If several merchants desire to have seed grown close together they would naturally, for their mutual benefit, have only the same variety grown where the areas are in close proximity. It may be suggested to merchants who contemplate having seed grown for them to more or less co-operate amongst themselves, so as to ensure pure seed being produced.

A proposal, however, that is of importance is that the number of varieties of any special crop should be reduced as far as possible. For instance, New Zealand could for the next few years get along very well with at the most two varieties of swedes (Champion and Superlative are tentatively suggested) instead of the large number that are grown at present. The same applies very much to hard turnips, soft turnips, and mangels. In this way the number of varieties grown would be small, and virtually whole districts would be devoted to one special variety.

If it is deemed necessary that regulations with regard to seed-growing should be framed, then, in my opinion, some system of licenses to grow seed might be introduced. Thus the Department's Fields Inspectors could decide whether a license should be granted

for any particular area for the particular variety that is required to be grown. In this way an effective system of control could be instituted.

ACREAGE REQUIRED OF SPECIAL SEEDS.

So far as New Zealand requirements of the principal special seeds in question are concerned, theoretically about 1,000 acres of swedes and turnips, 600 acres of rape, and 40 acres of mangels would be sufficient annually. There is, however, a point that must not be overlooked—that as we have relied in the past entirely on imported seed with regard to turnips and swedes it is likely that through lack of knowledge a good many failures would occur here, and the yield would in consequence be lower than that of Europe.

CERTIFICATE-OF-RECORD COWS.

A STUDY OF TYPE.

W. M. SINGLETON, Assistant Director, Dairy Division.

TWO FRIESIANS.

On the 3rd October, 1910, Dominion Mutual Mercedes of Rock was born in North America, and on the same date Dominion Domino's Pride was born in New Zealand. These two cows have been herd-mates at the Central Development Farm, Weraroa, since their first calving, and as first-prize winners in the dry and milking classes for the Friesian breed at the Palmerston North Show in November last they commanded a good deal of interest.

In these two animals we have exceptionally well-bred individuals. As dairy cows their yields prove them to be much above the average. There is nothing in common in the breeding of the two, unless it occurred before their ancestors left Holland. On conformation they are good illustrations of the two Friesian types commonly referred to in New Zealand, although with time this difference is likely to become less accentuated through the crossing of strains.

Dominion Mutual Mercedes of Rock was one of the importation selected by ex-Governor W. D. Hoard, of Wisconsin, probably the very foremost apostle of the "special-purpose dairy" form. His definition of "constitution" as it applies to dairy cows should be remembered by all breeders. He states, "Constitution is the power

to continue to the end within the line and limitation of purpose. Constitution must be looked for from other standpoints than the popular notion of hardiness. It must be gauged by the ability, within the close line of purpose, to endure the work." The close line of purpose in the dairy cow is the production of progeny and milk with its fat and other solids.

Dominion Domino's Pride, in her extended pedigree, according to the Friesian Herd-book, traces nine times to the imported bull Taureau. There is included under the entry for this bull in the "New Zealand Herd-book, other than Shorthorns," 1886, a note from the "Friesian Cattle Pedigree Book." Amongst other descriptive statements this includes the phrase "Flesh and Milk Form."

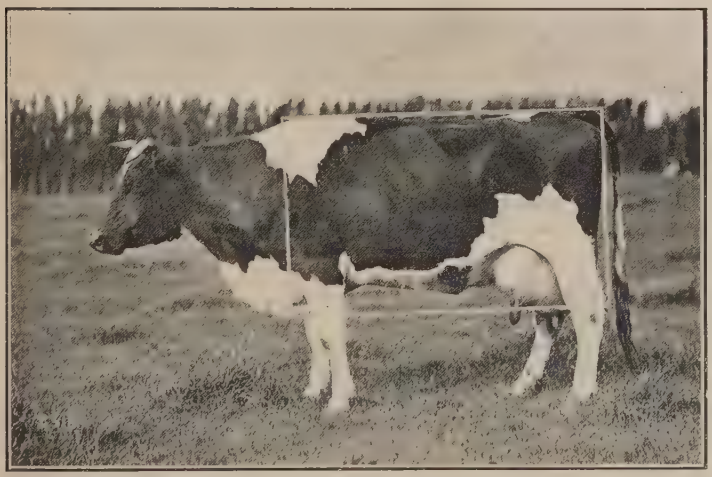
Of a number of differences in the general form of these two cows, Mercedes and Domino's Pride, one of the most manifest is perhaps that indicated in the comparative directions of their underneath lines, as drawn from the hock or bottom of the udder, to the lowest portion of the brisket. Mercedes's bottom line is not parallel to her top line, and were these extended forward they would meet. These lines so extended would, with a line from the tail-head to the hock, form one of the triangles required in the "special-purpose dairy" type.

Similar top and bottom lines for Domino's Pride, if properly joined up, will form not a triangle, but more of the indicated rectangle desired in beef breeds, as shown in the accompanying illustration. Unfortunately from our viewpoint, Mercedes was not photographed in the same position as Domino's Pride. The difference in the plane of their bottom lines is, however, further evidenced by the comparative distance between the knee and the brisket.

A comparison of the depth of body is not suggested, as Domino's Pride had calved shortly before the photographs were taken, whereas Mercedes calved a few days later. This consideration, however, does not affect the lines referred to above. In justice to Domino's Pride it may be further stated that for a time she had some udder trouble in one quarter. This has not been so severe as to debar her from winning first prize at Palmerston North. Further, we remember that a cow with only three of her quarters in milk proved in our cow-testing association work one year to be the highest producer of butter-fat in four associations, comprising some thousands of cows.

Domino's Pride and Mercedes came into profit with their first calves separated by an interval of only ten days. The next five calvings have, with one exception, as shown below, been exceedingly close together. These facts, together with the considerations of equality of age and feed, the similarity of milking-hours, attention, and of all other incidentals that together constitute environment, make the study of the work of these two cows very interesting.

DOMINION MUTUAL MERCEDES OF ROCK.



DOMINION DOMINO'S PRIDE.

The five lactation periods produced the following results, it being noted that both cows have commenced their sixth lactation period in less than one month later than five years from first calving, and within nine days of each other:—

Date of Calving.	Age.	Days in Milk.	Milk.	Fat.
	DOMINION DOMINO'S PRIDE.—BORN 3RD OCTOBER, 1910.			
	Years Days.		lb.	lb.
2/10/1912	1 364	365	10,140·60	370·81
25/10/1913	3 22	317	9,811·75	372·80
20/9/1914	3 352	308	9,762·25	350·38
20/9/1915	4 353	365	12,688·75	472·75
5/10/1916	6 2	268	6,966·25	261·18
29/10/1917	(calved again).			
		1,623	49,369·60	1,827·92
	DOMINION MUTUAL MERCEDES OF ROCK.—BORN 3RD OCTOBER, 1910.			
12/10/1912	2 10	362	11,604·30	373·06
9/10/1913	3 6	336	12,047·25	414·33
16/9/1914	3 348	356	12,628·75	427·19
30/10/1915	5 27	332	14,649·00	529·76
2/10/1916	5 364	345	12,146·25	435·32
7/11/1917	(calved again).			
		1,731	63,075·55	2,179·66
		TOTALS.		
Mercedes		1,731	63,075·55	2,179·66
Domino's Pride		1,623	49,369·60	1,827·92
Mercedes' extra credit ..		108	13,705·95	351·74

The larger quantity of milk produced by Dominion Mutual Mercedes of Rock would represent over 12,000 lb. of skim-milk or whey. The value of the by-product should be added to the value of the 351·74 lb. of extra butter-fat in estimating the monetary difference.

No reference has been made to the value of the progeny. The credits for each cow in this respect would doubtless depend on whether the purchasers' ideas were inclined towards the "flesh and milk" type or the "special-purpose dairy" type.

FEED-COST VARIES WITH TYPE.

Nature's provision in New Zealand of grass as a feed for dairy cows throughout the year's cycle makes it difficult to ascertain the weight of food nutrients consumed by cattle grazing in this country. In North America, where stall feeding is more in evidence, data are more easily procured. Professor Haecker, at the University of Minnesota, some years since divided his dairy herd into four classes—namely, (1) Beef type, (2) dual-purpose inclined toward beef,

(3) dual-purpose inclined toward dairy, (4) special-purpose dairy type. Strict account was kept of the yield, and of all food consumed by each individual cow, and thus the cost of production was calculated. The figures representing the feed-cost were reported as follows :—

	Per Pound Fat.
Beef type	.. 8·75d.
Dual-purpose inclined toward beef ..	.. 7·55d.
Dual-purpose inclined toward dairy ..	.. 7·30d.
Dairy type	.. 6·05d.

In every instance a cow of the special-purpose dairy type produced a pound of butter-fat at a lower feed-cost than did any animal in the other three classes.

If we group the two divisions of the dual-purpose class these figures show that the special-purpose dairy type produced butter-fat at a feed-cost of 6·05d., as against the dual-purpose at 7·42d., the latter figure being an increase of 22·6 per cent.

SOME FACTORS INFLUENCING COST OF PRODUCTION.

Individual cows may vary in their coefficient of digestion. Classes and breeds of cows representing larger numbers have been found to vary little in this respect. The food required for maintenance of the body and its functions for a dry cow have been found to vary as a rule in proportion to the live weight of the animal. The food consumed for milk-production depends on the yield of fat and other solids, and the amount required is calculated on this basis when a feeder compiles a balanced ration.

If a cow of the dual-purpose type and one of the special-purpose dairy type weigh the same throughout their milking season, and produce an equal weight of butter-fat and other solids, it might reasonably be assumed in the absence of data that the food-cost per pound of fat was much about the same under our New Zealand conditions. Usually the dual-purpose type weighs more, and the maintenance cost is therefore greater, since it takes food to vitalize the extra fat and to provide energy to transport the extra weight. Not only is this the case, but often the dual-purpose type of cow accumulates flesh during her milking season. Authorities inform us that it takes as much feed to produce a pound of beef-fat as is required to produce a pound of butter-fat. Dairymen must decide which of these classes of fat pays them best. The special-purpose dairy cow may store up body fat when approaching parturition, but this is converted into milk constituents during her next lactation period, when this class of cow depletes the body of all unnecessary surplus to the benefit of the owner's butter-fat return.

With the same rate of food-consumption per hundred pounds of live weight, the special-purpose dairy type usually has a credit for a larger production of butter-fat and of solids not fat. The spreading of the gross cost of feed for maintenance over this larger yield is doubtless the greatest factor in materially reducing the feed-cost per pound of butter-fat. The same principle is applicable to practically all other items which it is permissible to charge against the dairy cow for the year.

New Zealand's great asset in its equable climate, with a liberal rainfall, makes the provision of food for dairy cows an easy matter as compared with that of many competing countries. Under the salutary conditions obtaining our dairymen have not yet given that study to economical production which is likely to be the case when our rural population is materially increased. Since trials and experiments show that the special-purpose dairy cow will produce food for human consumption at a lower food-cost than will any other domesticated animal her future welfare is assured.

SHEEP-DIPPING POINTS.

SHEEP-DIPPING, properly carried out, repays its cost many times over. Dipping not only improves the condition of the wool, but it stimulates a healthy action of the skin, and consequently increases the rise of yolk and the weight of the fleece.

Whatever dip is used, carefully follow the directions accompanying it. These directions are arrived at after years of careful study by the manufacturers, and are not given to be improved upon at the discretion of the users.

Dip at least twice a year. Ewes and lambs may be dipped with a non-poisonous dip after the ewes are shorn. Another dipping with a poisonous dip about two months after shearing may be sufficient for the ewes; but the lambs (hoggets) should be dipped twice in the autumn, first with a non-poisonous dip, and then with a poisonous dip, and not less than fourteen days nor more than a month should intervene between the dippings. The whole flock should be dipped twice similarly, with the exception of the ewes dipped off the shears, for which one autumn dipping with a poisonous dip may be found sufficient.

Care should be taken to immerse thoroughly. Keep the crutch going. The time in the bath should be one minute.

Do not dip ewes immediately before putting to the ram. Several weeks should intervene.

Dip when the sheep are in a normal condition, the wool dry, and the weather mild.

Dip rams early. On no account should they be dipped after they are in condition for the season.—*J. L. Bruce, Assistant Director, Live-stock Division.*

NITROGEN FROM THE AIR.

POSSIBILITIES IN NEW ZEALAND.

J. ORCHISTON, M.I.E.E., Wellington.

[Paper read before the Wellington Industrial Association, 17th September, 1917.]

In 1785 Lord Cavendish and Mr. Priestley, an English chemist, discovered that by means of electrical sparks in a glass tube nitrous vapours could be produced.

In 1902 D. R. Lovejoy and Charles S. Bradley published the results of their experiments at the Niagara Falls in the production of nitrogen from the air. They used 12 h.p. of electric energy, which cost them at the rate of 18 dollars per horse-power per annum. Although this can only be classified as a laboratory experiment, they demonstrated the fact that given cheap power the fixation of atmospheric nitrogen by electricity was a feasible proposition.

Shortly after Lovejoy's and Bradley's experiments two Scandinavian inventors, Professor Birkeland and Dr. Eyde, of Norway, developed a practical scheme, and by 1911 they had some 200,000 h.p. harnessed at the Notodden and Rjukan Falls. At that period the demands so far exceeded the production that they had orders on hand for all they could produce for twelve months ahead. It was then decided to enlist fresh capital to duplicate the factory at Rjukan. The Germans were at one time interested, but the Scandinavians would not let them have control, and as the Norwegian Parliament passed laws having that effect they withdrew. At the same time Lord Revelstoke was asked by French banks to appoint an expert to report on the process. The late Dr. S. P. Thompson, an electrical engineer, was chosen, and his favourable opinion caused the French to assist. They have had every reason to be satisfied with the investment, and their co-operation is fortunate for the Allies.

The duplication of the Rjukan plant, which was commenced before the war, was completed last year. The power developed on the Rjukan River now exceeds 300,000 h.p., wholly devoted to the fixation of atmospheric nitrogen by means of the direct arc process.

Before the war there were a few factories in Austria, Germany, France, and Italy where water-power could be obtained at moderate cost. None of these, however, compared in size or output to that of the Norwegian factories. This is no doubt to be accounted for by the fact that these countries do not possess any large water-powers which could be so cheaply harnessed as those of Norway.

Immediately prior to the war, Germany, no doubt recognizing that in spite of her submarines and Zeppelins she might be cut off from

the Chile nitrates, set about the establishment of immense works at Biterfeld, near Berlin, for the fixation of atmospheric nitrogen, using a poor class of lignite of low calorific value for generating the necessary power to drive the electric dynamos. Some hundreds of thousands of horse-power are now being generated, and, according to the accounts received in the United States before relations were broken off, no less than 600,000 tons of cyanamide, 500,000 tons of nitrate, by means of the Haber process, and 400,000 tons from the gas-retorts, a total of 1,500,000 tons of nitrogen compounds, were then being produced in Germany. It is therefore very evident that but for the electric fixation of nitrogen Germany would have been unable to find sufficient nitrogen to meet her enormous demand for the manufacture of explosives, and hence the war would, in all probability, have been over before now.

Prior to the war Germany was the largest importer of Chile nitrates, taking no less than 900,000 tons per annum; the United States was next, with 600,000 tons; while Great Britain only imported about one-sixth the quantity that Germany did. The total exports of Chile nitrate was then about 2,000,000 tons per annum; now it exceeds 3,000,000, in spite of the fact that the Central Powers have ceased importations. Before the war it was estimated that two-thirds of the Chile exports were utilized as fertilizers, and one-third for explosives and other chemical works. Since the war these conditions have been reversed. I may here mention that Chile levies an export tax of some £2 10s. per ton, and must therefore be deriving a revenue at the present time of some seven or eight millions from this source alone.

Germany only produced some 20,000 tons of nitrate from the air in 1913, which grew to 100,000 tons during 1914, the first year of the war. After the Battle of the Marne she realized that her reserves of nitrogen might not be equal to her needs, in spite of a windfall of 250,000 tons found in Antwerp. Every endeavour was then made to expedite the completion of fresh factories, with the result that she is now turning out 1,100,000 tons of atmospheric nitrates per annum.

The power produced at the Biterfeld works costs £6 5s. 7½d. per horse-power per annum, which is a low figure for electric power produced by steam.

The cost of the hydro-electric power in Norway ranges from 8s. at Rjukan No. 1 to 24s. 7d. at Notodden per horse-power year. It will therefore be noted that the cheap steam-power developed in Germany does not compare favourably with the Norwegian water-power schemes.

It has often been argued by engineers and financiers, especially in the United States and in Great Britain, that water-powers have little advantage over first-class steam plants where coal can be obtained at moderate cost. This holds good where expensive races, dams, and pipe-lines have to be provided, which, in addition to a high capital outlay, may involve heavy maintenance charges for the upkeep of the races, renewal of pipes, &c. In most cases first-class water-powers are located in mountainous regions far removed from close settlement. It is true that the modern development in the electric transmission of power has enabled many water-powers to be utilized which were otherwise of no practicable value owing to their inaccessible locations. Such electric transmission has its limits, however, largely from an

£ s. d. point of view. The greater the distance the more expensive such transmission becomes, not only proportionally according to the added length of the transmission-line, but the greater the distance the greater the electrical difficulties.

Reverting to the relative costs of the Norwegian and German power plants, these two systems are probably the cheapest of their kind, and among the largest power-stations in the world. We have therefore a clear outline of the relative costs of both water and steam power under the most favourable conditions obtainable in each case. It will be observed that the power produced by the German steam plant at Biterfeld is over fifteen times more costly than that of the Norwegian water-power at Rjukan. Hitherto the two principal methods of fixing atmospheric nitrogen have been—first, that adopted by the Norwegians, called the "direct arc process," for the production of a dilute nitric acid; and the other the manufacture of cyanamide, which process was accidentally discovered by Professor Adolph Frank and Dr. N. Caro, two Germans, while endeavouring to produce a cheap form of cyanide so largely used in mining. Briefly, cyanamide consists of ground calcium carbide impregnated with pure nitrogen gas obtained by liquefying the air under a pressure of some 200 atmospheres. The process involves a considerable amount of labour, in addition to the cost of coke and lime for the manufacture of the calcium carbide. The finished product contains about 18 per cent. of nitrogen. Under this system the amount of nitrogen fixed is four times as much for any given power as compared to the direct arc process mostly in vogue in Norway. Hence the German preference for the cyanamide process, seeing that with them power is costly as compared to Norway, while labour in Germany is cheap.

It may be said of the direct arc process that it is a glutton for power, and unless the power can be obtained in large quantity and at low cost such method would not be a payable proposition. The principal advantage of the direct arc process is its great economy of labour as compared to the gross value of the output. As far as I can at present judge, the value of the product should exceed £1,000 per annum for each man employed at the works.

It is a recognized fact that New Zealand cannot successfully compete in the world's markets in the supply of goods which depend upon labour as the chief item in their production. Only those products which emanate from the natural resources of the country figure largely in our exports, such as wool, frozen meat, butter, cheese, gold, flax, kauri-gum, and timber. Although at one time the Dominion was a large exporter of grain, she is now an importer, largely due to labour conditions, as, although the gross return is much less, it is found to be safer to devote the cereal land to raising sheep for their wool and mutton. Continuous cropping will, of course, also exhaust the stored-up nitrogen in the soil.

The point I wish to emphasize is that in the manufacture of calcium nitrate by the direct arc process the amount of labour involved in comparison to the value of the output is less than that pertaining to any of our exports excepting wool, and it may even run wool for first place.

The whole question therefore hinges on whether we can harness water-power in sufficiently large units, and at bed-rock cost, for both capital outlay and annual upkeep.

I may set your minds at rest in so far as the North Island is concerned by stating there is no water-power in this Island of sufficient magnitude, combined with cheapness in developing and facility for transport of the manufactured article, which would be of value for the purpose. The only water-powers which comply with all requirements are those located on the west coast of Otago, and in so far as the facilities for cheap installation and convenience to deep-water harbours are concerned they are unique, and I doubt if they can be surpassed in any other part of the world.

The energy going to waste in the west of Otago approximates 2,000,000 horse-power. If the outlet of Lake Te Anau was diverted to George Sound by means of a five-mile tunnel no less than three-quarters of a million horse-power could be obtained from this source alone (a conservative estimate given by the late Mr. Hay, Chief Engineer of the Public Works Department). The initial capital per horse-power developed would be low, and in all probability the annual charges would not exceed the Norwegian record, with the added advantage that the Te Anau power would be delivered alongside a deep-water harbour, whereas the Norwegian power is eighty-six miles inland, involving the transport of goods by two sections of railway-line separated by ferry-steamers and finally conveyed by small river-steamers to the port of Skien.

I may here mention that the hydro-electric development at Niagara has cost about £20 for each horse-power installed, whereas the Te Anau power would probably be nearer £5.

The power sold at Niagara during the year 1909 realized £3 12s. 5d. per horse-power for that utilized in chemical-works, such as the manufacture of calcium carbide, carborundum, &c. This figure is too costly for the production of atmospheric nitrogen by means of the direct arc process. To better illustrate this, approximately 1½ h.p. is required night and day continuously for a whole year to produce a ton of calcium nitrate. The Niagara charges for the power alone would therefore amount to about £5 8s. 8d.—a figure in excess of the whole estimated cost of producing a ton of calcium nitrate at the Bowen Falls, Milford Sound. On the Canadian side of the falls, however, 64,000 tons of cyanamide were turned out last year.

Perhaps I should here mention the fact that a syndicate was formed in Dunedin some months ago for the purpose of prosecuting the manufacture of atmospheric nitrogen and other electro-chemical productions. Application was made to the Government for the power contained in the Bowen River, Milford Sound, but so far consent has been withheld. The Bowen can be cheaply harnessed by means of a comparatively short incline tunnel, and would produce from 15,000 h.p. to 30,000 h.p. It is conveniently situated alongside deep water, and has all the elements necessary for the establishment of a successful factory on a moderate scale. There are also a number of other possible powers, ranging from 10,000 h.p. to 20,000 h.p., within five to fifteen miles, which could all be economically conveyed to the factory by electric transmission if required. The Bowen alone has sufficient

capacity to produce £100,000 worth of products per annum. As the Bowen only represents from 1 per cent. to 1½ per cent. of the total energy available in the west of Otago, it will be seen that there are vast possibilities in this region. It is only a matter of time when it will all be utilized, producing many millions of pounds' worth of useful products annually. As an indication of what can be done, the output of the two Norwegian factories at Notodden and Rjukan in 1911 (the year during which they held orders for twelve months ahead) was 90,000 tons of calcium nitrates, 12,000 tons of sodium nitrates, and 4,000 tons of ammonium nitrate. The calcium nitrate was being sold c.i.f. English ports at £7 15s. per ton, and the ammonium nitrate at about £30. Allowing £2 5s. for transport charges across the lakes, rivers, and two separate lines of rail in addition to the ocean freight, this left only £5 10s. and £27 15s. per ton respectively, representing a net total of some £646,000 at the factories. This provided a good dividend, and induced them to find fresh capital for duplicating their principal factory, as already indicated.

At the present prices for calcium carbide in New Zealand the Bowen power would easily pay 100 per cent. dividend, and carry forward a substantial balance—but, of course, things are altogether abnormal just now; nevertheless that would be a very profitable side line under any conditions, seeing that the cost of the power would be only one-sixth of the Niagara power, where so much calcium carbide is manufactured.

Although nitrogen is one of the most prevalent elements, forming over 78 per cent. of the air we breathe, the remainder being oxygen, it is very elusive, and therefore difficult to capture and imprison in a marketable form. Foods may vary, and so do explosives, but when analysed there is ever present one chemical element in both, and that is nitrogen. It is true there are other constituents, possibly in greater proportion, so why single out nitrogen? Because in nature's workshop and in man's munition-factory nitrogen is the scarcest of the indispensable materials. The others are just as essential, but they can be obtained more easily. The supply of nitrogen is usually the first to give out, and when that happens the production comes to a standstill, either in the soil or the factory. Experience has shown that land holding $\frac{3}{10}$ of 1 per cent. of nitrogen will prove very fruitful, other things being equal. It may produce from 30 to 40 bushels of wheat to the acre. Soil containing $\frac{2}{10}$ of 1 per cent. will probably be good for about 25 bushels per acre. If $\frac{1}{10}$ of 1 per cent. it may produce 15 bushels, but if this essential plant-food be as low as $\frac{1}{20}$ of 1 per cent. the ground will be too poor to produce a profitable crop. In so far as the North Island is concerned there is not so much need for this fertilizer as in agricultural countries. As a rule, virgin lands contain a fair percentage of this element.

In the early "eighties" a yield of 130 bushels of potatoes per acre was considered a prime crop in Germany, but by 1914 the application of Chile nitrates had made it possible to count upon an output of 210 bushels per acre. Because the same course was not followed by the farmers in Russia, Austro-Hungary, France, and Italy, with similar if not better soil, they have not improved upon their crops of thirty or forty years ago. On the other hand, Great Britain, Belgium,

and Holland, profiting by Germany's example, were able to increase their production from 50 to 100 per cent.

Experience has shown that every pound of nitrogen rightly applied to the soil increases the yield of wheat, rye, barley, or oats by about 20 lb. of grain and 40 lb. of straw. In the case of potatoes 1 lb. of nitrogen will better the yield by about 85 lb.

Hitherto nitrogen fertilizers have not been much in demand in New Zealand. This is accounted for by the fact that virgin soils are not so deficient in this element as ground which has had a number of crops taken off it. Another, and a very good one, is the fact that Chile nitrates have been too costly as compared with phosphatic manure. It is estimated that calcium nitrate can be produced at the Bowen and sold to the farmers within the Dominion at about one-half the price previously charged for Chile sodium nitrate. It should not be overlooked that when nitrate of soda, the natural product of Chile, gives up its nitrogen to plants sodium is left behind, and may be deleterious to the soil. On the other hand, electrically produced fertilizers containing calcium leave only lime in the soil, which is usually advantageous.

Before closing this paper it should be mentioned that Professor John E. Bucher, of Brown University, New York, has brought out a patent for the fixation of atmospheric nitrogen without the aid of electricity. It seems to be a modification of the Haber process largely used in Germany. The substance of his discovery is that nitrogen will combine with an alkali and carbon in the presence of iron as a catalyst producing the cyanide. Reduced to concrete terms this means that he mixes soda-ash and powdered iron with powdered coke; upon heating this mixture in an ordinary furnace and running air over it the result is cyanide of soda, leaving the iron uncombined. It is obvious that soda-ash, powdered iron, and coke cannot be obtained for nothing, and that coal must be consumed in heating the furnace. I am therefore inclined to think that the Norwegians, with their cheap power, will not be greatly alarmed, nor will the promoters of the Bowen Falls scheme. The chief advantage of this discovery is that a factory can be quickly installed, and may be producing nitrogen before the surveys of a large hydro-electric scheme are completed. There is an enormous demand for nitrogen in the United States at present for explosives as well as for fertilizers, and it appears that the Government are devoting 4,000,000 dollars for the fixation of atmospheric nitrogen, possibly adopting Professor Bucher's scheme. A twenty-million-dollar vote was passed some time ago for the establishment of a hydro-electric factory for nitrogen-fixation, but from the latest accounts the committee were still considering the question of a site. A great deal of preliminary survey work is involved before the best selection can be fixed upon.

In a wheat crop which occupies part of the Marton experimental area this season the effect of past green-manuring experiments is very marked. Strips in the wheat corresponding to the old green-manured plots showed in December a much stronger growth, better colour, and greater freedom from rust, compared with other parts of the crop.

THE PRODUCTION OF CLEAN MILK FOR HUMAN CONSUMPTION.*

H. MUNRO, Inspector of Stock and of Dairies, Wellington.

WHILE the value of milk as human food, particularly for young children and invalids, is universally recognized, the many ways in which it may become contaminated, and its consequent danger to life and health, are not so fully realized. It is necessary, in the first place, to recognize that once foreign matter gains access to milk only the larger solids, which are the least injurious impurities, can be wholly removed; liquid filth and the greater proportion of the bacteria which are responsible for souring, putrefaction, and disease cannot be eliminated by mechanical means, such as straining. Efficient pasteurization of milk is of considerable benefit, in that it destroys dangerous bacteria and adds to its keeping-qualities; it is, nevertheless, only a partial remedy for milk which has already become contaminated. It follows, therefore, that milk which is once polluted remains permanently more or less damaged according to the extent of the pollution, and that care on the part of the producer to prevent contamination is infinitely more valuable from the standpoint of both public health and economy than any purifying treatment which can be applied later.

The conditions essential for the production of wholesome milk are healthy cows in good condition, clean milking, clean utensils, sanitary premises and surroundings, careful and prompt treatment of the milk after milking, and an ample supply of good water.

The principal sources of milk-contamination are dirt from the flanks, udders, and tails of the cows, from the milker's hands and clothes, and from unclean utensils, dust from the air, injurious odours due to insanitary surroundings, and improper treatment after milking. It is practically impossible to produce clean milk from cows which are driven through a quagmire to the milking-shed, held in a filthy yard prior to milking, or milked in dirty premises.

Before milking, the cow's udder and teats, and also the milker's hands, should be washed with clean water, and carefully dried. Dry cleaning is unsatisfactory, as the remaining scurf and dust

* In these notes the writer deals with the care of milk at the place of production only.

finds its way into the milk. Objectionable and injurious odours are very readily absorbed by milk, particularly when it is being poured, as in milking, straining, cooling, &c., or when stored in the vicinity of strong-smelling substances of any kind. Injurious bacteria of all kinds increase most readily in milk at a temperature of 80° to 100° F., and the rapidity of their increase diminishes proportionally as the temperature of the milk is lowered. Milk should therefore be removed from the milking-shed to the dairy as soon as possible after milking, and immediately strained and cooled. The dairy should be kept exclusively for storing and treating milk, and should not be used as a storeroom for any other commodity.

The straining of milk through open gauze strainers or open-textured or dirty cloths is only a pretence, and cannot be too strongly condemned. The straining should be done through cotton-wool. on the principle of the "Ulax" strainer, or if on occasions it is found necessary to use cloths they should be clean and of close-textured material, and should be washed and boiled after treating each lot of milk.

For cooling, the corrugated circular cooler is most suitable, as by its use the milk while being cooled is to some extent simultaneously aerated. It is also the easiest type of cooler to clean, which is in itself a strong recommendation. The temperature to which milk can be cooled depends on the volume in which it is permitted to flow over the cooler, as well as on the temperature of the water used. Artesian water, being usually pure as well as cold, is the most suitable source of supply for cooling. When this is not procurable underground tanks so constructed as to prevent the entry of surface water or foreign matter, and fitted with a hand-pump, provide the best substitute. Where milking-machines are installed the pumping can, of course, be done by machinery. When the water is stored in tanks above ground, or conveyed in pipes, these should be protected from the sun.

In order to retain the milk at the low temperature secured by passing over the cooler, and also to reduce it still lower if possible, the cans containing the cooled milk should be placed in a concrete trough in the dairy containing sufficient water to cover them to within a few inches of the tops, and provided with a constant flow. Wooden troughs are unsuitable for this purpose. Warm milk should on no account be mixed with cold milk.

Straining, cooling, and aerating purifies milk, and increases its keeping-qualities by removing foreign matter, retarding the development of bacteria, and helping to remove objectionable odours and gases. The value of such treatment, however, depends to a great extent on the time which is permitted to elapse between the milking

and the treatment, as well as on the efficiency with which the work is done. If the milk is allowed to stand for some time after milking before being strained and cooled the value of each process will be correspondingly reduced.

The milk from cows showing signs of disease or sickness in any form should be discarded until the cause is ascertained and the animal completely recovers or is disposed of. Even in the absence of other and more definite symptoms, a rapid diminution of the milk-yield is characteristic of abnormal health in a cow, and in all such cases the milk should be discarded until the yield returns to normal or the cause of the drop is known to be harmless. Milk produced from cows for twenty-one days before calving is usually not normal milk, and it is not advisable to mix it with milk intended for human consumption. Milk produced from cows for several days after calving is unfit for human consumption, more particularly for infants. By regulation under the Food and Drugs Act it is made an offence to sell milk from a cow for seven clear days after calving. Milk which appears in any way abnormal, such as bloody, watery, or slimy, should be unhesitatingly discarded, even when the cow appears in good health and the udder normal.

Milk-cans and other metal utensils used for handling milk should be well tinned, and so constructed as to permit of easy cleaning; wooden vessels of any kind are unsuitable for handling milk. Rusty cans are not only difficult to clean, but the flavour of milk contained in them is injuriously affected. Utensils having open seams, crevices, or corners, such as kerosene-tins, which are occasionally converted into milk-buckets, permit the accumulation of decomposed milk, rust, and slime, and are consequently quite unsuitable for handling milk.

Milk utensils should be cleaned immediately after they have been used, and before the milk has time to dry on them. They should be first rinsed with cold water, then washed with hot water and soda, again rinsed with clean water, and finally scalded with boiling water. Immediately they are scalded they should be inverted on a draining-stand, so that they may dry quickly exposed to the sun and protected from dust. Brushes should always be used for washing. If very hot water is used on utensils with milk still adhering to them a coating of milk will eventually become scalded on to the metal, and will be found difficult to remove. Milk utensils may appear to be clean after being washed with warm water, but unless they have been scalded they will probably still contain numerous bacteria which will hasten the souring of milk.

The increasing shortage of good dairy labour during the past two years has been responsible for a rapid increase in the installation of

milking-machines. In the opinion of the writer, given proper care, machines provide a more sanitary method of producing milk than hand milking, as by the former method the milk is to a great extent protected from contamination from the skin of the cow, human hands, and odours from the milking-shed. Too great stress cannot, however, be placed on the necessity for regular and thorough cleansing of every part of the plant, as carelessness in the cleansing of any part will readily convert their advantages into a menace.

The plant should be erected so that water can be pumped through the whole system—both releaser and vacuum—and angles in the milk-pipes should be as far as possible avoided. Milk should not be released in the milking-shed or engine-room; it should be released over a cooler into cans in a separate apartment, and then removed to the dairy.

The following is a copy of directions issued by the Dairy Division of the Department for the cleaning of milking-machines :—

Requisites.

1. Plentiful supply of clean cold water.
2. Provision for boiling water.
3. Set of suitable brushes for cleaning rubber tubing and piping.
4. Vacuum-tank should be so placed that drainage connects with main drain.
5. Vacuum-tank should be fitted up outside the sheds where the air is pure, and in such a position that it may be easily cleaned.
6. Two or three wash-up tubs placed outside the milking-shed.
7. Have milk-pipes on automatic releasers erected in lengths of not more than 6 ft.
8. Vacuum-pipes should be laid so as to allow water to be ejected or pumped through them and drain to the vacuum-tank.
9. Use only rubber parts which are sound. Split inflations result in the contamination of the whole vacuum system, and where such have been in use thorough cleansing should take place before next milking.
10. Where steam is in use the pipes should be so arranged as to allow it to be blown through the whole system.

Before Milking.

1. Rinse all rubber parts and buckets with clean cold water.
2. Wash cows' teats and udder with clean water and dry with a clean cloth before putting on teat-cups.

After Milking.

1. Draw cold water through teat-cups, releaser, and vacuum-tank.
2. Wash any dirt from outside of teat-cups and tubes after placing in tub No. 1.

3. Take down pipes of automatic releasers daily for washing.

4. Every day wash with a brush in hot soda-water in tub No. 2 all parts with which milk comes in contact—viz., teat-cups, tubes, releaser-pipes, &c. This should be done as soon after milking as possible. Draw brush through daily.

5. After these parts are thoroughly washed they should be rinsed with clean water and then thoroughly scalded with boiling water.

6. Leave all rubbers in a bath of clean water to which some lime or salt has been added. This water should be fresh every day.

7. Scald all rubber parts daily.

8. Flush out vacuum pipes and tank with hot soda-water daily.

9. Remove bottom or top of vacuum-tank daily; opening tap is not sufficient. Taps of pipes should be given special attention and left open when not in use.

10. After washing, place the milk-buckets outside and expose them to the sun and fresh air.

Dont's.

1. Do not use kerosene-tins to carry away milk.

2. Do not use lukewarm water where scalding is specified.

3. Do not use a cloth for washing any dairy utensil; use a brush.

A grave responsibility rests on all who are connected with the production and handling of milk for human consumption, and any act of carelessness which results in the contaminating of such milk may ultimately be responsible for mortality or serious illness, particularly among infants.

Young Trees and Bracken.—In his last annual report Mr. J. Mason, Assistant Forester in charge of the Waiotapu State Plantation, remarks as follows regarding that area: "The trees suitable for rapidly outgrowing and suppressing bracken are limited to a few species. The Corsican pine, which is somewhat slow for the first few years, needs protection from the bracken (by clearing) for four or five years after planting. With the Monterey (insignis) pine a period of two years is generally sufficient to enable the trees to get well above the bracken. A lot of two-year-old seedling Monterey pine which were planted five years ago, at the rate of 2,700 to the acre, have completely covered the ground, and several specimens measured show an increase in height-growth of 7 ft., and one as much as 9 ft. 6 in. for the past season. The average height of the trees in this compartment is now 14 ft. *Pinus teocote* comes next to the Monterey pine in rapidity of growth, but has the disadvantage of being rather tender and having a poor root-system. The average height for this species is, under fair conditions, 16 ft. for six-year-old trees. *Pinus patula* is also a rapid grower, trees four years old having produced an abundance of branches which completely cover the ground, and having attained an average height of 10 ft."

PRESERVATION OF UNFERMENTED GRAPE-JUICE.

S. F. ANDERSON, Vine and Wine Instructor.

THE preserving of the juice of ripe grapes other than by fermentation is a matter that has aroused considerable interest among those who object to the use of alcoholic drinks and others who would appreciate a pure fruit-juice. Compared with the juices of other fruits as a beverage that of the grape stands pre-eminent. The grape has the great advantage, too, that up to 85 per cent. of the fruit is juice. Apart from its pre-eminence as a healthy and agreeable beverage grape-juice can be produced more abundantly — therefore more cheaply—than any other fruit-juice. The demand for it in this country has so far not been great, but no doubt this is mainly because comparatively few people have tasted it. There is a probability that when put up in an attractive form, with the guarantee of absolute purity, grape-juice is likely to take a strong hold among the beverages of the country.

It has been stated that the method used in the preparation of grape-juice causes to disappear the natural aroma of the grapes from which it is prepared. This is not so. We have the opinion of those eminent authorities Messrs. A. Despeissis, of Western Australia, and F. T. Bioletti, of California, that the must (unfermented juice) of grapes can be preserved and retain the aroma of the fruit.

In extracting the juice from the grapes, straining, sterilizing, storing, bottling, &c., it must be realized by the maker that he is dealing with a liquid substance that rapidly becomes a living mass. If freshly expressed grape-juice is examined under a microscope it will be found that no bacteria, no yeast, and few moulds are present. If, however, it be examined again in a few hours, when bubbles have commenced to rise, a large number of various kinds of yeasts and moulds can be discovered. Especially is this so if the temperature is about 65° or 70° F. It is therefore very necessary that the plant for doing this work be such that there is no time lost in expressing and sterilizing the grape-juice. After sterilizing more time can be taken, but the quicker the whole process, from extracting the juice to the final disposal of it into bottles, the better.

With the exception of the grape Teinturier the juice of all the wine-grapes grown in New Zealand is white or amber in colour. It

may be desirable, however, to have a coloured article similar to claret. In that case, by turning the hot pasteurized juice into a vat containing the skins of red grapes almost any desired depth of colour may be obtained, depending on the variety of the grape and the time the hot must is left in contact with the skins. The must prepared in this way, however, differs in other respects than in colour from the white must. Besides colouring-matter, various substances are extracted from the skins, the principal being tannin. This makes the composition of red must more like that of red wine, though of course it still contains no alcohol. This would doubtless make red must useful in medicine, as it would possess certain tonic properties not found in the white must. The following table by Mr. A. Despeissis gives the several ingredients of freshly pressed grape-must previous to fermentation :—

	Parts.
Water	80 to 85
Grape-sugar (dextrose and lævulose)	15 ,, 28
Free acids (tartaric, tannic)	0·1 ,, 1
Salts of organic acids (tartrates, malates); citrates of potassium, calcium, &c.	0·4 ,, 0·8
Salts of mineral acids, sulphates, nitrates, phosphates, silicates of potassium, calcium, magnesium, iron	0·3 ,, 1
Albumious matters	0·3 ,, 1

Any unfermented wine, therefore, showing substances not mentioned in this analysis must have been tampered with, and ceases to be pure grape-juice. Another table of a pure grape-must made by a Government chemist in Austria, and one of must made by Mr. G. E. Colby at the Agricultural Experimental Station of the University of California, is as follows :—

	Austria.	California.
Solid contents by spindle (Balling) ..	21·62	20·60
Alcohol	None	None
Total acid (as tartaric)	0·78	0·53
Volatile acid	0·01	0·03
Grape-sugar	19·62	19·15
Cream of tartar	0·61	0·59
Free tartaric acid	0·30	0·07
Ash	0·37	0·19
Phosphoric acid	0·02	0·04

No cane-sugar, starch-sugar, or antiseptics were found in the Austrian or Californian musts. Artificial (aniline) colouring-matter, salicylic and boracic acids, formalin, and fluorides were tested for in the Californian must, but none were present.

In conformity with the regulations under the Sale of Food and Drugs Act (N.Z.) it is illegal to add any antiseptic to preserve grape-juice, or any flavouring-matter to disguise the natural taste of the grape the juice or must is taken from.

As the object of this article is to assist producers in preparing and placing on the market a pure, wholesome, and non-alcoholic

vinous juice, it is not recommended or desirable that the latter should be of a syrupy nature, although if not naturally sweet enough it may be brought up to that condition by the addition of pure cane-sugar. An advantage possessed by grape-juice for the market is that it is ready for use very soon after being made, although it is improved by being kept a few months before being sent out.

It should be possible to profitably conduct a business in either small or large quantities, but by the inexperienced it must necessarily be commenced on a modest scale. The directions here given should enable almost any grape-grower to commence operations, and gradually, as he acquires confidence and skill, to extend them more largely.

In preparing these notes more attention has been given to general principles than to detailed methods. The methods will vary considerably according to the facilities and appliances within reach of the maker. Free use has been made of matter written by Messrs. T. Bioletti and A. M. Dal Piaz, of the Agricultural Experimental Station, University of California, and Mr. A. Despeissis, of Western Australia.

METHODS OF OPERATION AND UTENSILS REQUIRED.

When grapes are crushed and the juice expressed the latter will be contaminated by the spores of the yeast bacteria washed from the skins. In the air these spores are dry and inert, but as soon as surrounded by the must, which is a favourable medium, they become active. If the must is warm this change to an active state occurs very soon. If, on the contrary, the grapes and must are cool the increase is much slower. This change, then, is the beginning of fermentation. The main object of the producer who wishes to place "pure unfermented grape-juice" on the market is to prevent this fermentation.

As a start, then, it would be well to provide means for cooling the grapes. In this connection one has to recognize that grapes must be picked dry. If the weather is very fine there will possibly be a heavy dew. By the time that has dried it is warm, and the grapes then would require time to cool. The best time for gathering may be afternoon. In that case allow the grapes to stand all night in a cool building, and start the crushing first thing in the morning. If the temperature can be controlled so as to be under 59° F. the must may safely be left to settle for twelve hours or more, as this greatly facilitates subsequent filtering.

The apparatus required for making 24 gallons, in addition to the ordinary cellar utensils, will be — An ordinary open copper boiler for heating the must, sterilizing the bottles and corks, and for the second heating-up of the must in the bottles; a small quarter-cask (a brandy quarter-cask, which holds about 28 gallons, would do);

and a small vat. The vat may be an ordinary hogshead of 60 gallons cut down.

To make 24 gallons will require about 410 lb. of grapes—that is, provided they are well pressed out. After pressing, the juice is then run into the vat and allowed to settle for, say, twelve hours. The time for settling, however, depends on the temperature. If the operations are being carried out in a cool shed and temperature low it might be longer, but if the temperature is above 60° the juice should be left but a few hours. When ready draw it off and put it into the copper. Heat gradually up to 185° F.—keeping below rather than above this temperature—and stirring to make sure the juice is all heated alike. Use the thermometer frequently, and as soon as it approaches 185° draw the fire. When sufficiently cool the juice can be put into the small quarter-cask and bunged airtight. Then, when convenient, within twenty-four hours, filter the juice and put it at once into sterilized bottles. A filter may be made of ordinary flannel. It should be cone-shaped, 9 in. to 1 ft. across the open end, running off to a point. The open end should be sewn round a small hoop to keep it open, and the cone be about 2 ft. long, as shown in the figure. For bottling 24 gallons 144 ordinary 1½-pint bottles will be required. As the bottles are filled they should be immediately corked. The whole process of filtering, bottling, and corking should be completed in one day.

FLANNEL FILTER FOR GRAPE-JUICE.

The second sterilizing has now to be done. The bottom of the boiler being round, a temporary floor made of some thin fruit-case wood or similar contrivance to form a level is required on which to stand the bottles in the boiler. The boiler is then filled with water to the level of the necks of the bottles and heated up to 185°. The temperature should not exceed this, or it may cause a precipitation of solid matters, which cause the must to become cloudy in the bottles. The final operation is to tie the corks down with strong twine or wire (sewing-twine is the best) and to dip the top of the necks of the bottles into wax.

SUMMARY AND CONCLUSION.

The following important points should be specially noted :—

1. Only sound, clean, and perfectly ripe grapes should be used.

2. The crushing of the grapes, transferring and clearing of the must, and keeping the same before sterilizing should be done under the coolest conditions available.

3. The greatest cleanliness is necessary in every stage of the process.

4. Too much stress cannot be laid on the importance of sterilizing by the use of boiling water all utensils, bottles, corks, casks, &c., shortly before use. The juice of grapes, being of a sticky nature, affords a fertile ground for the catching and propagation of the ferment and other bacteria.

5. Careful use must be made of the thermometer when taking temperatures, because overheating causes a cooked flavour, while too low a temperature would fail to arrest fermentation.

6. Arrange as far as possible to do the work in convenient stages, such as—First day, gather grapes in the afternoon; second day, crush, press out, and put in vat (which keep covered); third day, sterilize, cool, strain through filter, and bottle if possible in the one day.

The directions here given are for dealing with the matter in a small way and within the reach of most of those carrying on a small vineyard. Little, if any, further outlay is required, and there are good prospects for a speedy sale of the produce. If the vineyard-proprietor is satisfied with the success of a small output, plant can be obtained for a much larger one. Special pasteurizers, tanks, and filters are manufactured for this work.

SHEEP-MAGGOT FLIES.

SINCE there is some doubt as to which species of blow-fly is mostly responsible for blowing sheep, and whether one species does the damage in one district and not in another, it is desirable in order to clear up this question that living specimens of maggots from blown sheep be procured from all parts of New Zealand. Sheepowners willing to assist are asked to kindly forward living specimens to "The Biologist, Central Development Farm, Weraroa." Specimens are best sent in a tin containing damp oatmeal. A note should be enclosed stating whether the maggots are from wool, feet, or horn-cavities, together with date of capture, locality, and any remarks on the extent of damage done in the district.

The parasitic flies *Syrphus ortas* and *Phorocera marginata*, illustrated on page 306 of last month's *Journal*, in the article entitled "Control of New-Zealand-Flax Grubs," were enlarged 3½ diameters.

INSIGNIS-PINE DISEASE.

THE insignis pine, valuable as it is in New Zealand forestry, has a lurking danger. Its very rapid growth in New Zealand is partly due to the forcing climate and rainfall, but the damp weather brings a liability to disease. An attack which looked alarming for some months on the trees of the Wellington hills has passed off; but it would be of use to New Zealand forestry if any persons having experience of similar attacks would record them.

The attack at Khandallah (an outlying suburb) began early in winter, and all through the wet weather gradually increased. During the wet warm weather of spring it was at its worst. From 5 to 10 per cent. of all the trees one saw from the roads were affected. It seemed worst along the most frequented roads, as if the infection had come from outside. The leaves (not the shoots) turned brown and then fell off. One tree got blackened stems, and has not yet recovered. The others began to put forth fresh leaves as soon as the dry weather set in during October, and by the end of November new leaves had taken the place of the old.

Trees at Ngaio were also affected. There seems uncertainty as to whether any similar attack has occurred before at Khandallah. This disease differs from the *Peridermium* disease that has attacked the insignis pine in the damper parts of South Australia (and in places in New Zealand) in that only the leaves are affected, and when they fall off the tree puts forth fresh leaves and recovers. In the South Australian disease the genus has been identified by the microscope investigators as *Peridermium*. In this the twigs are attacked, and in the second stage the leading shoots. It has done some mischief in Australia—insignis-pine plantations dying off in acres together—but the disease has not spread as it was feared it might two years ago.

Insignis pine has had similar attacks in South Africa, but not of a serious nature, except in the summer rainfall of the Natal side. The Monterey (insignis) pine, in its own habitat in southern California, is a pine of a light winter rainfall and rainless though misty summer. It is summer rains or heavy winter rains that are to be feared for it in New Zealand.—*D. E. Hutchins, I.F.S.*

The Japanese walnut-trees planted at Ruakura ten years ago have grown well, and are bearing heavier crops each season. The nuts are produced in clusters of from fifteen to twenty nuts. The tree makes very good summer shelter.

BROWN-ROT IN CHERRIES CONTROLLED.

THE only cherry-orchard in the writer's district that has been comparatively free from brown-rot this season is that of Mr. G. W. Shailer, Palmerston North, in which less than 1 per cent. of the fruit was affected at time of picking. Mr. Shailer's test plot of cherries consists of 2 acres, of many varieties, the whole being netted in. This orchard has been kept thoroughly cultivated and free from weeds; it is surrounded by a Lombardy poplar hedge of an average height of 40 ft.

On visiting the orchard in the middle of December I was surprised to find extremely little disease, mummified fruit being observed on two trees only. I then examined the fruit in the packing-shed as it was coming in, and found perhaps half a dozen affected fruits. About six weeks previously considerably more infected fruit was to be seen than at time of picking.

Last year Mr. Shailer lost the greater portion of his cherry crop through brown-rot. He therefore formulated and undertook a series of sprayings with a view to saving the present season's crop, as follows: In the late autumn, as soon as the leaves had fallen, the trees were sprayed with bordeaux, 8-6-40, and again, just before the buds burst, with bordeaux, 4-4-50. Three sprays of 2-2-50 bordeaux were then given at ten days' intervals from the time the buds burst till the time the appearance of thrips was first noticed. From the time the thrips appeared till a week before the fruit was ready to pick the trees were sprayed at ten-day intervals with bordeaux, 2-2-50, with the addition of 1 lb. arsenate of lead. The thrips were kept under with the combination spray; on examining affected leaves with a hand-lens none were found alive.

At one period, three weeks before the first picking, the foliage of about half a dozen trees was scorched by the combination spray. As only that small number had been scorched out of the whole area sprayed at the same time, Mr. Shailer came to the conclusion that it was probably due to the action of the sun's rays on those particular trees, the time when they were sprayed being the only period during that day in which the sun was visible, it being cloudy generally.

Mr. Shailer claims that the constant application of the combination spray had a beneficial effect on the fruit in that it prevented the cracking or splitting due to excessive osmosis, his reason being that the spray toughened the epidermis and rendered it more flexible.

Certainly, although the cherry season was wet, there were very few fruits damaged through cracking.

The trees were manured in the early spring with an application of superphosphate.—*G. H. Cunningham, Orchard Instructor, Palmerston North.*

POINTS IN SOUNDS COUNTRY MANAGEMENT.

H. SMITH, Fields Inspector, Havelock.

ALTHOUGH certain of the land in the Marlborough Sounds country has deteriorated very considerably owing to mismanagement, the country as a whole is gradually improving. This is not due to scientific farming nor the methods adopted by farmers in dealing with their pastures, &c., but largely to the quantity of danthonia-grass which has been introduced and became established by stocking with sheep from danthonia country.

One of the most prominent features of the Sounds to-day, however, is the fact that many runs which have been in occupation by their respective holders for periods extending from ten to twenty years are still infested by a heavy growth of fern and other rubbish. It is well known that the difficulty of dealing with fern country in the district has tremendously increased, and the reason is that insufficient care has been exercised in the burning, grassing, and stocking of new lands. Provided that immediate returns are secured, too many farmers fail to give thought to future considerations, but insist upon opening up a fresh piece of bush land each year, until ultimately they find that there is a greater area under their care than they can properly deal with or adequately stock. The result is that these places carry proportionately fewer sheep than would smaller areas carefully grassed and stocked.

Periodical heavy stocking has been carried out with significant results by some settlers, and land treated in this way shows the best returns in the Sounds to-day; but unfortunately, as indicated, there are many who look more to area than entertain the suggestion of less scope and better quality. A rotation of pastures on areas of the country could be profitably worked and assisted with the early March burn, followed by proper sowing. This should secure good feed for the late spring when it is required for heavy stocking.

The growth and propagation of foxglove in the Sounds country is attributable entirely to the regrettable neglect of a few farmers in not

attending to its eradication when the weed made its first appearance years ago. Personally I consider that if the moneys annually expended in trying to eradicate the weed by pulling, cutting, &c., were put into fencing-material and good clean grass-seeds of strong vitality an economy of great value would be accomplished, and ultimately the foxglove would be smothered out, whereby also the carrying-capacity of the land would be increased. Foxglove will not propagate to any extent on country where a good sward of grasses exists, and this emphasizes the necessity of sowing with a better and heavier mixture than those hitherto used.

The decrease in carrying-capacity which has occurred on some runs during the past few years is not really due to the growth of foxglove, as is suggested by some farmers, but to continual and serious neglect in allowing the fern-fronds to expand, after which it is too late in the season to consider crushing with sheep. As has been proved, the best results from burning fern follow the early March burn. Notwithstanding this, fires are to be seen during many other months of the year, when the fern evil is only intensified. In the circumstances brought about by the war it is impossible to secure much amelioration of those lands which are badly infested with foxglove, but care should be given to its eradication on isolated patches so as to prevent further spreading.

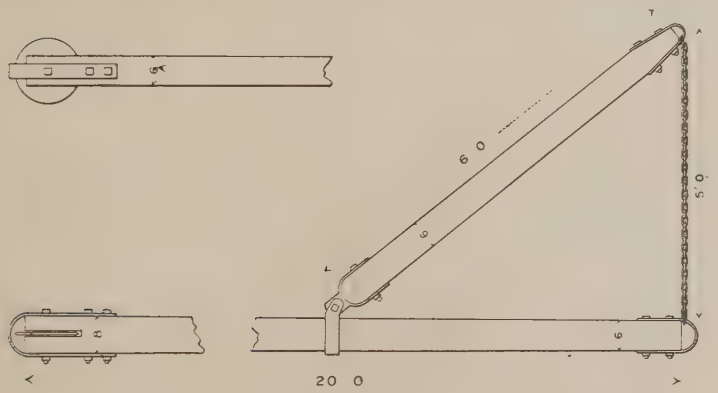
Those farmers who are not taking the necessary steps to eradicate fern by systematic and timely burns, proper sowings of good grass-seed, and periodical heavy stocking will never eradicate foxglove nor improve the carrying-capacity of their lands. This weed will always exist and thrive where there is fern to harbour the seed. If care is taken, however, in dealing with the new country, so as to prevent it becoming practically useless, as has been the case with much of the land, the old pastures with proper management will gradually improve, and production will increase rapidly.

Mr. W. S. Hill, formerly plant-breeder in the Department, who joined the Expeditionary Force a year or two ago, and saw considerable service in France, is reported to be now occupying a position as (military) agricultural expert with the New Zealand troops in England.

Exchange of Seeds.—Mr. D. E. Hutchins writes: "J. Rafn, the well-known Copenhagen seedsman, whose researches on forest-tree-seed germination are a distinct contribution to forestry, asks if any private persons in New Zealand would care to exchange seeds with him, or supply seeds of insignis pine or macrocarpa cypress on payment. Mr. Rafn's researches have been published lately in European forestry journals. His full address is 'Johannes Rafn, Seed-merchant, Copenhagen-F, Denmark.'"

MANUKA-CLEARING IMPLEMENTS.

THE accompanying illustration represents a good type of horse-drawn implement for crushing manuka of fair size that has been burnt standing and is practically dead. The metal parts can be made by a blacksmith, and the implement constructed by any handy settler. The method of working is to hitch the team to the head of the beam and work around the edge of the burnt manuka, a swath of the stuff being taken and pulled down by the chain connecting the beam and the arm shown in the diagram. The advantage of this method is



MANUKA-CRUSHING IMPLEMENT.
Upper figure shows side view of tail of beam and skeith.

that the horses do not have to go through the standing manuka, the work being done on the principle of a mowing-machine. The implement here shown was made by Mr. N. H. Ashford, of Waotu, Putaruru, on the Rotorua line, who has introduced an improvement in the shape of a skeith at the tail of the beam. The skeith runs slightly in the ground and prevents the end of the beam from coming round when the arm and chain meet with any specially heavy stuff. Mr. Ashford has also designed and constructed a powerful but simply operated horse-rake that will gather the pulled-down manuka into rows ready for burning. He has applied for a patent for this implement. Both implements have proved themselves great labour-savers and a means of rapidly clearing up manuka country in process of breaking-in.

WORK FOR THE COMING MONTH.

THE ORCHARD.

J. A. CAMPBELL, Assistant Director, Horticulture Division.

THE 1917–18 fruit season is now in full swing, and what with attention to the packing and marketing of apple, pear, and stone-fruit crops, together with spraying, cultivation, summer pruning, and sundry other matters, the average grower will for a time no doubt find himself more than comfortably occupied. The season is very much better climatically than the previous one, and crops, although not heavy, will in many instances be quite up to the average. Apples in the main are likely to be good, with pears below normal, while stone-fruits will average light crops only.

BROWN-ROT AND BLACK-SPOT.

Brown-rot and black-spot are again very much in evidence in many orchards. The former disease, although not so destructive as during the past two seasons, mainly owing to improved climatic conditions and a more careful spraying treatment, is largely responsible for the shortage of stone-fruits.

Brown-rot is held in America to be easily the most destructive stone-fruit disease, and judging by our experience of it up to the present it is very evident that it has already, and is likely for some time to maintain, that particular distinction in this country. It was confidently expected that thorough cleanliness in the orchard, combined with summer spraying, would prove successful in controlling the disease. Numerous tests, both departmental and private, were undertaken along these lines. Although it is somewhat too early to report definitely on the results, it is quite evident that they have not in all cases been as successful as anticipated. At the same time sufficient success has been gained to warrant their continuance.* A full report will be given at a later date on the experiments referred to. In the meantime all affected fruit should be gathered and destroyed.

Black-spot, at one time our worst, is still easily our second most troublesome fungus disease. Black-spot is spread more or less throughout the country, and given conditions of climate favourable to it and lack of preventive measures on the part of the orchardist it becomes in its season immediately evident. Once this takes place the problem of its control is increased tenfold. In the average district, however, with proper treatment, black-spot can be kept thoroughly well in hand under almost any circumstances. Nevertheless there are localities and situations where it is extremely difficult to make this rule apply. In low-

* See note on page 38 of this issue, by Mr. G. H. Cunningham, on the control of brown-rot in Mr. G. W. Shailer's cherry-orchard at Palmerston North.

lying situations and districts having a cold tenacious soil, particularly when kept wet through bad weather, black-spot assumes a more serious aspect. Not only does the disease flourish apace under such conditions, but the vitality of the tree is often such as to render it a ready prey to disease. The Department is arranging to take over several acres of a pear-orchard in a locality such as that referred to, with a view to definitely demonstrating next season the practical control of black-spot under such conditions.

PACKING AND MARKETING.

The New Zealand fruitgrower is coming to realize more thoroughly year by year the bearing that careful sorting and packing has upon the successful marketing of his fruit crop, and consequently upon his yearly profits. As a result, considerable improvement has been effected during the past few years; nevertheless only the fringe of the question has really been touched. This question will have to be taken up very much more thoroughly and universally before the fruit-markets of the Dominion can be considered to be in a satisfactory condition—that is, a condition when an auctioneer or other selling agent can confidently guarantee practically any line submitted to him for sale as being uniform throughout, and the buyer can purchase the same with equal confidence.

At the present time there is far too much speculative buying and selling of fruit, with the result that the purchaser invariably cuts his price to cover the speculation. Even in the case of those districts and individual fruitgrowers who do pay special attention to packing, the trouble to some extent remains the same. The trouble in these instances is the standard, or lack of standard, adopted. The most that is done is to grade and to pack clean, sound fruit. The worst that we have on our markets would be difficult to describe, as it ranges from the foregoing to rough ill-made packages containing fruit of all sizes and states of maturity, often badly bruised and diseased, as well as packages of mixed varieties put up with intent to deceive, such as Epps Seedling or other poor sort topped with a popular variety like the Sturmer.

In short, we have no fruit-packing standards applying to our local markets—that is, no standards of quality, colour, grade, and pack bearing universal indicating-marks by virtue of which a purchaser might have a knowledge of and rely upon securing fruit of any particular standard. No doubt it will be some time before we can organize our fruit trade to this extent, but the aims of the fruitgrowing community should be in this direction, with a view to systematizing the trade and thereby increasing the confidence between buyer and seller. The grower who puts on the market the inferior class of fruit referred to is preying upon the more methodical grower, while the buyer, through the lack of reliable standards, is compelled in self-protection to prey more or less upon the whole.

A number of the fruitgrowing States in America have adopted standard packing rules. In many instances such rules have been made law by State legislatures and apply to inter-State trade. Indicating marks or words are used to denote each grade, such as "Extra Fancy," "Fancy," "Choice," &c. There is a standard of quality set for each

grade. If fruit is not separated into the different classes it must be sold as "mixed," this or some similar word having to be clearly branded on the package. The whole object of these regulations is to guarantee to the purchaser the quality of the fruit packed, and to indicate the standard of quality by means of distinctive marking on the packages. Regulations on similar lines would have been in operation in New Zealand in connection with our fruit export trade had not the war caused that trade to be temporarily relinquished.

Growers who are fortunate enough to have co-operative fruit-packing companies established in their districts will find such companies an immense advantage in relieving them of the labour and worry connected with the detail work of packing and marketing their crops. The formation of such companies should be encouraged in every district where sufficient support to ensure successful working is guaranteed, as there appears to be no doubt whatever that such concerns are destined to play an all-important part in the future organization of our fruit-markets and the distribution of fruit. Those already in operation are adopting their own standard packs on the lines previously mentioned, and there is every reason to hope that in the near future this will result in a universal packing standard being adopted and the present haphazard practice abolished.

CURRENT SPRAYING-WORK.

Codlin-moth, Leaf-roller, and Pear-slug.—Although in warmer districts of the Dominion it is often found necessary to continue spraying for codlin-moth and leaf-roller through the month of March, generally speaking little is required in this direction after the end of February. In the meantime, however, it is very important that all pip-fruit trees be kept well coated with an arsenate-of-lead spray. Particular attention should be paid to the last spraying before picking. If this period is too long, or the coating of the mixture becomes otherwise weakened, there is a great danger of incipient moth-infection taking place, which, owing to the difficulty of detection, constitutes a serious menace not only to stored fruit, but also to fruit which is being placed on the market. The period between the last spraying and picking should not exceed a fortnight or seventeen days.

Red Mite, Woolly Aphis, &c.—Lime-sulphur 1–100 to 1–120, atomic sulphur 10 lb. to 100 gallons water, or Black-leaf-40 at the strength of 1 to 800 of water, may be used for these insects in combination with arsenate of lead. The latter spray is preferable for woolly aphis, and may be used in conjunction with either lime-sulphur or atomic sulphur.

Pear-slug on Stone-fruits.—Spray with arsenate of lead, $\frac{1}{4}$ oz. to gallon of water. Particular attention should be paid to young trees.

CULTIVATION.

Surface cultivation should not be neglected. Not only should all weeds be kept down, but the soil-surface kept loose by frequent cultivation, in order to conserve an adequate supply of moisture for the benefit of the tree and the proper development of the fruit crop.

COVER-CROPS.

The mechanical condition of almost all soils is improved by the raising and ploughing-in of a suitable cover-crop. This applies more particularly to heavy tenacious soils, and those of a light and sandy nature. To what extent green-manuring is required in any particular section depends, of course, on the amount of humus already in the soil; but where it is intended to be carried out preparations should be put in hand immediately. The best time to sow the seed is towards the end of February or the beginning of March. A cover-crop has the additional advantage of holding soil together by means of the roots of the plants. This is an important consideration in those situations and soils liable to scouring. Suitable cover-crop plants are white lupin, vetches, field-peas, *Lotus angustissimus*, horse-beans, white mustard, oats, &c.

POULTRY-KEEPING.

F. C. BROWN, Chief Poultry Instructor.

THE GROWING PULLETS.

WHERE the hatching operations have been carried out at the right time, and the young stock are at a safe age, February will be more or less a slack month. To the observant poultryman, however, it will be a very interesting period, and one of much importance as regards future success. It is a good time to closely study the requirements of the growing birds, as well as the development of the young ones produced from the different matings.

In this connection too much care cannot be taken in handling the growing pullet. Firstly, she must be brought naturally to maturity. This can only be done by correct feeding and management. It is far too common at the present time to see pullets commencing to lay at about four months and a half old. This, of course, is a mistake, as such birds never grow to a desired size, nor do they produce a decent-sized marketable egg, and are therefore useless as breeding-stock. Especially does proper handling of the pullets apply at the present time, when there is a decided tendency for many useful breeds of poultry to become much below the standard weight of their breed. The fact of a pullet coming to maturity at a very young age indicates that its reproductive organs have developed before it has had time to build up a good frame. The same applies with equal force to a young male. Obviously, to breed from such rapidly maturing stock must mean ruination of the strain in the near future.

The chief weakness with many in handling the growing pullet lies in supplying too rich a diet, such as meat, meat-meal, or similar nitrogenous materials. The bad effect of an oversupply of meat food is accentuated when the birds are provided with an ample supply of skim-milk to drink. It should be remembered that milk is not only a drink for fowls, but a rich food as well. Milk is certainly an excellent

food for chickens of all ages, but judgment must be exercised as to the amount supplied. When fed to excess its forcing effect will not only bring the growing chicken to pre-maturity, but ovarian troubles will follow as well. Where milk is being supplied in large quantities, and the pullets show the slightest evidence of coming to lay at too early an age, it should be eliminated from the ration, or, at any rate, given in a less quantity to drink.

The feeding in general of the growing pullet is most important. Too often the same ration is fed to all members of the flock, whether they be four-, five-, or six-months-old pullets, or even adult stock. A case came under my notice the other day of White Leghorn pullets commencing to lay at four months and a half old. These birds were confined in a house from the day they were hatched, were given milk to drink, and had the same mash—containing a big supply of blood-meal—as the laying flock. In this case the owner, being under the common but mistaken idea that early maturity was indicative of heavy-producing stock, was naturally proud of his birds. Judging, however, by their size (they were more like bantams than White Leghorns), as well as the small-sized eggs produced, they were not desirable stock to perpetuate.

The object of the poultryman should be to keep his pullets steadily growing by providing plain food and a good range, and by careful management generally. The food supplied should contain the elements needed to build up frame and bone, rather than to develop the egg organs. For this purpose there is nothing better than a good, wholesome grain mixture, of which nice plump oats, whether crushed or whole, should be the chief ingredient. Oats are certainly expensive at the present time, but even so if a good short, stout quality is available they will probably prove in the long-run one of the cheapest diets for the growing chicken. It should never be forgotten that inferior oats are dear at practically any price. They chiefly consist of husk, which is next to useless as a food. Green food is, of course, the life of a growing bird, and should be supplied with a free hand. On no account should growing birds be kept in too confined quarters, or what may be termed hothouse conditions, otherwise they will become overforced. The covered-in house is the ideal place for the laying pullet, especially when winter eggs are the objective, but for the growing bird too much range cannot be provided.

The fact that the modern egg-type of pullet is put to a severe strain almost before it has attained maturity makes it imperative that the bird should develop naturally and grow the desired "timber," so that it may have the power to resist disease and last out a long heavy-laying season. Not when a bird commences to lay, but the number of good saleable eggs she will produce in two seasons, while at the same time being a desirable breeding-bird, is the factor that determines her value. The age of six months is soon enough for a pullet to start her period of production, and this may be extended in the case of the heavier breeds. The day has, indeed, long gone for the argument to hold good that early maturity is an index to profitable production.

To sum up: For pullets to commence to lay just when they are required it is necessary that they receive every consideration in the matter of feeding and housing. Draught-proof houses (but giving

abundance of fresh air) kept in a thoroughly clean condition and providing ample accommodation, well-sheltered runs, green food, clean water, grit, and a generous supply of proper food, together with as much range as possible, are indispensable factors in the requisite management.

DUCKS AND LAYING.

Several cases have come recently under my notice of Indian Runner ducks not laying up to expectation. In some instances the trouble was due to the owners being compelled to change the diet, owing to inability to obtain a regular supply of the usual ration provided. In other cases the owners have adopted the plan of changing the feed, being under the impression that it was the right thing to do. Of course, this is a mistake. Ducks are of a very nervous temperament, and any alteration in the method of feeding will have a decided effect on the egg-yield. Where the changing of the feed is unavoidable it should, if possible, be done by degrees. A sudden change of food or quarters for the laying duck will often result in entire refusal to eat, with consequently a reduced egg return. That laying ducks require a change of food is one of those theories which lamentably fail in practice.

CROOKED BREAST-BONES.

This trouble is usually the result of allowing young stock to roost at too early an age (especially when unsuitable perches are provided) or where they have been allowed to roost in trees, while sometimes it is due to constitutional weakness. A bent breast-bone lessens the value of a table bird, and is often responsible for a good bird being passed in the show-pen. Perches should not be provided till the young birds are at least three months old. Even then small, narrow perches should not be used, as they are apt to have an injurious effect not only on the breast-bone but on the hock-joints as well. For growing chickens perches should be made of timber not less than 3 in. wide. Before chickens are given perches the floor of the house on which they sleep should be well bedded down with straw, pine-needles, or other similar material. It is always a mistake to allow chickens to sleep on a hard floor which has insufficient covering to keep the breast-bones off the hard surface.

THE APIARY.

E. A. EARP, Apiary Instructor.

THE EXTRACTING SEASON.

By this time, provided weather conditions are favourable, extracting will be in full swing in all districts. There may be two or more extractings during the season, or the honey may be left in the hives till the close of the flow and the whole crop removed at one time. In the latter case the beekeeper needs an ample supply of supers and combs, and must watch attentively that the hives do not become honey-bound and the bees commence loafing. The better plan is to have two or three extract-

ings during the season, removing at the first operation all combs in which the honey is wholly or three-parts sealed. When these are emptied and returned to the hives the excluders should be brought into use if they are not already in the hives. Choose the hot sunny days for the work, as on such days the honey runs freely and the bees are good-tempered. A good plan is to remove the honey in the morning, stacking the supers in the honey-house as they are removed, preparatory to extracting in the afternoon. By this method all stray bees can be removed before the actual work of extracting commences, and the operator can work quickly and peacefully at emptying the combs till the evening, when the empty combs can be returned to the hives. By the morning the bees will have settled down and returned to the task of refilling. "Keep the extractor running" is a good maxim once the work has commenced, and every hot day should be utilized for gathering the harvest.

Removing Honey from the Hives.

Honey should not be removed from the hives until it is well ripened. When the surfaces of the combs are a half to three-parts capped the honey is usually sufficiently ripe to enable the beekeeper to extract with perfect safety. In northern districts the practice of taking off "green honey," to be afterwards ripened in the tanks, has been to some extent carried out, but the humidity of the climate must be the deciding factor. In southern districts such procedure would be dangerous, and care should be exercised and only well-ripened honey taken. By taking unripe honey fermentation will often result, rendering it unfit for consumption. When the time for extracting is at hand the usual practice is to remove the combs one by one, and to brush or shake off the adhering bees. As the combs are relieved of the bees they should be stacked in a super, to be afterwards removed to the honey-house. It is a wise precaution at all times to place a cloth over the combs in the super, and if there are any signs of robbing it is a good plan to use a damp cloth which has been previously immersed in water containing a small percentage of carbolic acid.

Strainers.

Some form of strainer should be adopted to catch the larger particles of wax, dead bees, &c., in the honey as it leaves the extractor and before it finally reaches the tank. It is a simple matter to strain the honey, and yet this important part of the work receives less attention than its importance demands. It should be the aim of every beekeeper to see that his product is rendered as marketable as possible before it finally reaches the customer, and thus create a name for a high-class article. Wax is not a component part of honey, and dead bees are foreign matter, and yet they are frequently found in honey exposed for sale. Honey containing either is not likely to suit the buyer, and its selling-value is consequently reduced. To ensure that all but the smallest particles of wax will be removed the honey should be run through a fine wire strainer, and finally passed through fine cheesecloth before entering the tank. Cheesecloth strainers are cheap and are easily made, and should be cleansed after each day's operations. The strainers should be of such construction as to be easily cleaned, and if the cloth is tacked into wooden frames the operation is greatly facilitated. Use cold water when cleansing the strainers: hot water melts the particles

of wax, thereby clogging the holes in the cloth; whereas cold water removes all wax from the surface. Hang the strainers up to dry, so as to be ready for use when required.

Honey-tank.

No part of the apiary equipment is of more importance at extracting-time than a good tank. From the strainers in use it is advantageous to run the honey into a tank, so that the small particles of wax that pass through the strainers will rise to the surface, when they can be skimmed off before finally drawing the honey off at the bottom of the tank. Many beekeepers run their honey direct from the strainers into tins and small packages ready for sale, with the result that the small particles of wax rise to the surface to the detriment of the honey and its sale. Frequently complaints are made as to the quality of the honey, and not infrequently adulteration is suspected through an excess of these wax particles rising to the surface. Such honey should not find its way to market, its condition being brought about by sheer neglect on the part of the beekeeper to provide adequate tank accommodation. By allowing the honey to settle in the tank the air-bubbles escape, the small particles of wax rise to the surface, and in dry weather surplus water is evaporated. The size of the tank to be adopted must be decided by the beekeeper himself, as it is hard to find two beekeepers with requirements alike in the matter of honey-tanks. He must study his needs and convenience, but in any case the tank should hold enough to enable him to deal with the honey in the hives at the time of extracting. The tank illustrated in Bulletin No. 55, "Bee-culture," in use at the Department's experimental apiary, is capable of dealing with the product of two hundred colonies, and is so arranged that each extracting can be left undisturbed until it is matured and ready to be run off into the tins.

Cleanliness in the Honey-house.

It should hardly be necessary to point out that the greatest care must be taken in preparing honey for market. However, it is by no means an uncommon thing to come across cases where the beekeeper appears to have lost sight of the fact that honey is a food, and, what is of more importance, a food which is eaten uncooked. Too much stress cannot be laid on the fact that everything in the honey-house should receive the same attention as dairy utensils. The extractor and tank cannot be washed out every day during the season, but they should be thoroughly scalded before commencing operations, and whenever honey is allowed to remain in them they should be covered with clean washing covers. These cost little, are easily made, and should be very much in evidence throughout the season. On no account should bees, flies, dust, or other foreign matter be allowed to alight on the honey in the tank, and as soon as extracting is finished for the day the extractor should be closely covered with a cloth. Finally, as a fitting close to the day's work, the floor of the extracting-room should be washed, and every drop of honey spilt during the day removed.

Use of the Wheelbarrow.

The work of taking honey from the hives is tedious, and entails a great deal of heavy lifting. More especially is this the case where

proper working equipment is wanting. To facilitate and expedite operations it will be found convenient to provide a good barrow or truck for carrying at least two supers. The barrow should be so constructed that it can be fitted with a shallow metal tray to catch the drips of honey when the combs are placed in the supers. Such an arrangement will prevent the honey from dripping on the barrow and make for cleaner w rk. Cases have come under my notice where beekeepers handling tons of honey carry all their honey from the hives to the extracting-house, but the labour involved thereby is such as to render it well-nigh impossible to handle the crop successfully. Suitable barrows for general apiary work may be purchased at small cost from dealers in bee-supplies.

SUPERSEDING QUEENS.

During the progress of the honey-flow it is wise not to overlook the work proceeding in the brood-chamber. All old and failing queens should be superseded, and queenless hives supplied with young queens. To a large extent weather conditions play an important part in the mating of the queens, and if by any chance they are not able to take a wedding flight they will develop into drone-layers. As fertilization of the queens takes place in the air, good weather must prevail or the drones will not fly. Hence the necessity of overhauling the hives to note their condition. It is highly important that all colonies should go into winter quarters headed by a vigorous mother. Too many colonies are lost by queens failing in the spring months. The activities of the queen should be such as to meet abnormal wastage, and brood-rearing should proceed, or spring dwindling will assuredly follow. A good queen will keep her brood-nest compact and fill the combs solid with brood from end bar to end bar, whereas failing queens scatter the brood, laying a patch of eggs here and there. When such queens are detected immediate attention should be paid to superseding them. If, as advised previously, nucleus colonies were formed for the purpose of carrying out queen-rearing during the season the surplus queens can be utilized for the purpose of doing the work. If no queens are on hand send immediately to a recognized queen-breeder for an Italian queen, so that when introduced she may proceed with egg-laying before the winter weather approaches.

TREATMENT OF DISEASE.

The work of putting colonies under treatment where disease is detected should not be postponed. The season is a short one, and every effort should be made to winter only clean hives. The risk of having disease spread by robbing during the off season, when it is most likely to break out, will lead to endless work in the spring unless the beekeeper is in earnest in checking the spread of disease during favourable conditions. No better plan can be followed than to treat all infected colonies by the McEvoy method during the late flow. Many beekeepers are too ready to postpone treatment, only to find in the spring their hives weak in bees and consequently in poor condition for successful treatment. No half-measures should be adopted when dealing with foul-brood, and in all cases the "double shake" should be practised if the disease is to be entirely eradicated. A good plan

to follow if any doubt exists as to the complete absence of disease is to mark all infected colonies, and to leave them to be finally dealt with after the clean colonies are extracted. In any case the combs should be marked with the number of the hive to which they belong, so that when they are extracted they may be returned to the colony from which they were taken. If these precautions are taken the risk of spreading disease by means of wet combs is minimized.

THE GARDEN.

W. H. TAYLOR, Horticulturist.

VEGETABLE-CULTURE.

THE most important work just now is to complete arrangements for the winter supply of cabbages, broccoli, brussels sprouts, savoys, and kale. In the colder parts of the Dominion planting of these should by now be completed; in the southern parts of the North Island the middle of February is quite late enough. Unless the plants have made good growth before the short days intervene they will do little good, whereas they will continue to grow all winter when an early start has been made. Even in the warmer parts it is not safe to delay the planting long after the time stated, for although the temperature may be higher the hours of sunshine are not increased.

A good bed of spinach is valuable during the winter season, and, being practically immune from injury by insect and other pests, it is easily obtained. Sow in shallow drills 12 in. to 15 in. apart, and thin the plants to from 8 in. to 10 in. apart. The soil should be fairly rich in humus, stable manure, or green matter dug in. If stable manure is used chemical fertilizer is not required, except a dressing of nitrate of soda occasionally during the growing-period. Nitrate of soda should never be given till the plants are up. One ounce per square yard may be given two or three times at intervals of four weeks. If stable manure is not available give sulphate of potash, 1 cwt. per acre, or kainit, 4 cwt. per acre. Spinach-seed should be sown about the third week in February, at which time the surface soil is usually dry. Work the soil to a fine tilth and make it firm. After the seed is in the drills, and before covering it with soil, water well by running the rose of a water-can along the drills; then cover with the soil thrown out, which, being dry, will act as a mulch and retain the moisture. The young plants will be through the soil in about ten days.

Silver-beet sown at the same time and in the same way will come on in time for winter use. This also is a sure crop; the so-called cabbage-fly does not touch it. Thin the plants to 10 in. or 12 in. apart. The best variety for garden use is Giant Lucullus, which has crisp white stems and tender crinkled leaves. The stems make an excellent dish; they should be cut to about 1 in. lengths and stewed till tender.

New Zealand spinach (*Tetragonia expansa*) is a useful plant for busy people. In habit it is a trailer, and one plant will cover a square yard of ground. The leaves are similar in appearance to those of spinach, but more

fleshy, and the flavour nearly approaches that of spinach. It will do in quite poor soil. A plant or two on a bank or spare corner will prove a useful stand-by. On good soil the leaves are larger, and consequently more succulent. This plant has long been cultivated in gardens in Europe, but has not become popular in its own country. Some thirty years ago the late Professor Thomas Kirk endeavoured to popularize the plant in New Zealand at the time when the diamond-backed moth so badly devastated the cabbage crops.

Sow a small breadth of turnip, also lettuce, and put in the last lot of French beans for the season. French and runner beans should be gathered as soon as they are ready, even if the beans are not wanted for use. If beans form in the pods the growth of the plant soon stops.

The last-sown carrots and parsnips should be ready for thinning. The thinning of carrots should be more severe than is usual for early crops. Each root of this crop should have room to develop to full size, and each plant stand clear of its neighbours. The distance apart should be in accordance with the relative size of the variety. Thus, Sinclair's Champion requires to be from 6 in. to 8 in. from crown to crown, and Intermediates about half that distance. Parsnips should stand from 5 in. to 6 in. from crown to crown.

Tomatoes: There is evidence that the early blossoms have fallen rather extensively. This is mainly attributable to changeable weather, the temperature having often been more like winter than summer. The trouble has been most pronounced on fairly rich and moist soils, where the plants are rather soft, and doubtless it will end when settled warm weather intervenes. The loss can to some extent be made good by allowing laterals on the lower parts of the plants to extend till they form a bunch of flowers, then stopping the laterals and removing all the leaves that are on them. Retain the leaves on the main stem. Spraying should be attended to; the plants may have escaped blight hitherto, but it is most likely to show up, particularly on flat country, when the days begin to shorten.

Potatoes: There is no necessity for leaving potatoes in the ground till the haulm is dead. When the skin on the tubers is set so that it will not rub off easily they will keep well enough. One precaution is necessary when digging early, and that is not to leave the tubers in the sun a moment longer than is necessary, as they scald and green quickly. In extra-hot places they should not be bagged up while they are hot from sun-heat. Better to turn them out of the bags on to the floor of an airy shed, and bag up when they have cooled off, as they are likely to sweat in the bags if left in them in a hot state.

Some remarks about moulding-up made in the Garden notes in the last October *Journal* appear to have been wrongly interpreted as meaning that moulding is not necessary. A more careful reading of the paragraph in question will show it has a contrary meaning. Moulding-up does not increase the crop, but it is quite necessary in order to ensure the covering of the tubers to prevent greening, and also to preserve the haulm from the effect of wind. A quite opposite method of cultivation is often adopted to secure early crops in places subject to frost. A trench is dug a spit deep, the bottom forked up, and the sets put in. As the haulm grows, soil is pushed in until the trench is full. The advantage of this method is that it is easy to protect the tops from frost until they get above the trench, when the frost period is past.

Needless to say, the soil must be deep and well drained. Also this method is only adapted to small cultivations, as the labour involved is considerable. Good crops are secured in this way, and the plan is frequently adopted in windy places. I know where potato crops are now growing in this way.

SMALL FRUITS.

Raspberries.—In some localities the small bronze beetle has been very troublesome this season. The beetles eat through the bark on the soft wood, which causes the shoots to break off. Poisonous sprays cannot be employed while fruit is ripening, and the canes should be thoroughly sprayed prior to that, using 2 lb. arsenate of lead to 50 gallons water. The beetles fall to the ground if disturbed, the slightest touch causing them to fall.* It is easy to run through the rows now and again and draw a light rod along the canes, thus preventing a lot of damage, which, however, will probably not be very extensive if spraying is done as suggested. The rows should not be allowed to become crowded with waste suckers; keep them cut out. Raspberries require a fair amount of moisture, and a crowded state of growth robs the fruiting-stools of this essential element; so also does a rank growth of weeds, particularly couch-grass. The surface soil should be kept loose and clean, but deep cultivation should be avoided, raspberries being shallow-rooting plants. If a plantation becomes overrun with couch it is best to abandon it.

Strawberries.—Runners should be restricted in number. If they are wanted for planting strong runners are best, and, if not wanted, growing them robs the soil and weakens the old plants. Runners should be separated from the parent plants as soon as they are well rooted.

Gooseberries are frequently attacked by the leaf-spot disease. If left unchecked it will most likely defoliate the bushes, which will probably cause them to burst into new leaf by the breaking of the buds that should remain dormant till next spring. If that occurs there will be little or no fruit next season. It is a wise precaution to spray the bushes with 4-4-40 bordeaux, whether the disease has appeared or not, prevention being better than cure. Lime-sulphur, 1 in 100, may be used in place of bordeaux.

* Since writing this a letter has been received from a correspondent whom we had advised to try shaking the beetles on to a sheet of canvas. Our correspondent states that he found he could not use canvas, but instead used a kerosene-tin with perfect success, having succeeded in practically ridding his canes of the beetles in the course of a few days. Boiling water was poured on the beetles in the tin, 12,000 dead beetles being counted in all.

ANSWERS TO CORRESPONDENTS.

IN every instance a question to which an answer is desired in the *Journal* must be accompanied by the full name and the postal address of the inquirer, not necessarily for publication, but as a guarantee of good faith. Letters should be addressed to the Editor.

RENAL CONGESTION IN LAMBS.

J. S. W., Lowcliffe :—

Would you kindly inform me as to the cause of lambs being weak in the hind legs. I have often noticed them, when trying to run, apparently lose their power and roll over on to their backs. I have several lambs affected with the same complaint. Please state cure, if any.

The Live-stock Division :—

It would appear that your lambs are suffering from acute renal congestion, the principal causes of which are cold, wet, and stormy weather, or dietetic. Where the feed is the cause it is due to overloading the kidneys with more work than their state of health warrants, and we find that all the treatment required is to shift the animals on to poorer feed. If your lambs are in forward condition for slaughter, it would, of course, pay you better to let a few go wrong rather than give the whole a set-back; but if not intended for immediate slaughter we would advise changing the feed and allowing plenty of exercise.

PHOSPHORIC ACID IN FERTILIZER ANALYSES.

GEORGE MEEK, Gore :—

In mixed fertilizers which contain superphosphate some analyses show the phosphoric acid in the superphosphate in the soluble column, while others show the phosphoric acid contained in the superphosphate, plus the phosphoric content of the other ingredients, in the insoluble content. Which is correct ?

The Fields Division :—

When superphosphate is mixed with another fertilizer containing tricalcic phosphate reversion takes place to an extent depending upon the relative proportion of the two ingredients of the mixture. Should the tricalcic phosphate be in excess, all the water-soluble phosphate of the superphosphate will be reverted in time, and the analysis should show no phosphoric anhydride in the soluble column.

RELATIVE VALUE OF DUNG MANURES.

"BARMOYA," Ngaio :—

What are the relative values of horse, sheep, cow, fowl, and pig manure for ordinary vegetable-garden use ?

The Horticulture Division :—

It is impossible to definitely state the values of these manures. The food the animals live upon has to be reckoned with : thus the manure of stall-fed horses is more valuable than that from grass-fed animals. In determining the values of respective manures the state of the soil should be considered. Cow-manure and pig-manure is valuable for light sandy soil, but acts injuriously on heavy or medium-heavy soils by rendering them too tenacious. Horse-manure is valuable to all soils, as it can be applied in varying conditions. Fowl-manure should be dried and applied in the way of artificial manure. Speaking generally, fowl-manure is the strongest, next pig-manure, then horse-manure, with cow-manure last.

CUTTING MACROCARPA-TREES.

"TURUA," Wellington :—

Kindly advise the proper time to trim macrocarpa-trees. I have these trees planted along my front fence, and am thinking of trimming them so as to make a hedge. Some of them have now grown to a height of 12 ft., and I propose cutting them down to about 6 ft. or 8 ft. Could they be cut at any season of the year, and will they stand severe cutting ?

The Horticulture Division :—

Generally speaking, *Cupressus macrocarpa* trees may be cut at any time. This statement, however, requires qualifying when the cutting involves fairly large branches that are required to sprout again, and when such is the case early spring or late winter would probably be best. No statement can be made, without being subject to contradiction, as to whether or not macrocarpas will stand severe cutting. In some cases the trees respond very well to cutting back; in some cases they do not. It is always a risky operation, and none can say with certainty what conditions rule the matter.

LIVE WEIGHT AND DEAD WEIGHT OF PIGS.

G. HARRISON, Ramarama :—

I shall be glad if you can tell me the difference between the live weight and the dead weight of pigs—(1) baconers, (2) porkers.

The Live-stock Division :—

In the case of baconers, for dressed weight of carcase deduct 31 per cent. from live weight on the farm, or 27½ per cent. at the works if, say, two days after leaving farm. With porkers, deduct 35 per cent. or 31 per cent. under similar conditions.

GROWING POTATOES FROM TRUE SEED.

"SUBSCRIBER," Ohinemuri :—

Kindly inform me as to the best way to grow potatoes from the seed of the flower. When is the best time to sow the seed ? Should the plants be transplanted direct from the seed-bed to the permanent position, or should they be transplanted first a few inches apart in small protected beds and afterwards transplanted into the permanent positions ?

The Fields Division :—

When fully ripe the apple containing the true seed of the potato should be squeezed in water, the pulp removed, and the seed spread thinly on the inside of a cotton bag. To separate the seeds, rub the bag as soon as the seed is dry, and then store in a bottle until required for use the following September or October. The apple usually falls off the plant before it is fully ripe—when a month or five weeks old. Let it ripen on the ground ; a flower-pot can be placed over it. If you know the time of the year when your district is free from frost, sow the seeds nine weeks before, so that you can transplant to permanent positions without risk. The seed is best sown in boxes in a rather poor sandy loam. It germinates in ten days, and when a month old prick the seedlings out into pots or boxes, spacing a few inches apart. Avoid forcing-manures, and note that the soil used for raising the plants should be poorer than that of the permanent position. When transplanting finally, space the plant 2 ft. 6 in. apart in rows, and let the rows be the same distance apart, so that the produce of each plant may be separately lifted. If you start the seed early in spring you will require a cool greenhouse or frame protection.

JOHNSON GRASS.

F. PRATT, Christchurch :—

Can you inform me if Johnson grass has been tried in New Zealand ? I understand that it is valued as a hay-producer in the coastal areas of the United States of America on the Gulf of Mexico. Do you know if it would be likely to thrive on the sandy coastal area of Canterbury and be of use ?

The Fields Division :—

Johnson grass (*Sorghum halepense*) has been grown in New Zealand in a few places in the North Island, and has been tested at the experimental farms. It produces a rough, coarse hay in fairly heavy quantities. Owing to its spreading underground stems—being in this particular far worse than twitch—it has never become popular in New Zealand. Although hardy as a general rule, it is likely in the South Island to be cut with severe frosts. Sudan grass, a plant that has recently been very extensively advocated as a summer forage or annual hay crop, is almost identical with Johnson grass, except that it is at most a biennial, and does not possess underground stems. If Johnson grass could be kept in bounds it might be valuable as summer forage and for the production of coarse hay, but it would certainly be a safer policy to use Sudan grass. Johnson grass grows fairly well on lands that are not too dry, but where moisture is deficient the yield is comparatively low.

DEALING WITH OX-EYE DAISY.

H. E. BUTLER, Paeroa :—

I have a paddock that the yellow ox-eye daisy has taken almost complete control of. It has been top-dressed with superphosphate this spring. I may add that the flood-water was over it several times during last winter. Can you suggest a remedy ?

The Fields Division :—

If the ox-eye daisy has got a hold of the land your best course would be to break up the paddock and cultivate at intervals during the summer months, and resow in the autumn with a grass-mixture. If breaking up is very inconvenient keep the weed well fed down—with sheep particularly. Eradication can be effected only by breaking up and thoroughly cultivating the land.

SCOUR IN SHEEP.

C. J., Mangatu :—

Can you give me a remedy for scour in sheep ? I have lost several ewes through that trouble. My ewes were low in condition this past spring owing to the long cold wet winter, and when the new season's growth commenced they started to scour. I shore early in order to give them a chance to improve, but they still continued to scour.

The Live-stock Division :—

The only remedy we could suggest would be in the shape of dry feed, such as hay, straw, chaff, or oats—whichever can be most easily secured. It is of the utmost importance that the sheep should recover their normal condition before next winter sets in. A salt-lick would be beneficial, and in case parasites are a contributing cause you should administer some worm tabloids.

CHICORY IN PASTURES.

"SUBSCRIBER," Whangarei :—

Please let me know whether there would be any danger of chicory becoming a nuisance if sown on volcanic land for sheep-feeding ; and would it throw much feed in dry weather ? The grass dries up very much in summer on this land, only deep-rooting plants keeping green.

The Fields Division :—

From 1 lb. to 2 lb. of chicory is often included in grass-mixtures, but in order to get a fair bulk of feed from it the land must be of good quality. On very dry land the plants do not give much feed, as the leaves remain more or less flattened on the ground. Many of the plants are liable to run to seed rapidly, and, as sheep

do not feed on the flowering-stems, chicory nearly always seeds itself in pastures. It cannot, however, be looked upon as any particular nuisance, even when it spreads considerably, as heavy stocking will keep it within bounds. On dry danthonia country chicory invariably disappears after a few years, and is permanent only on fairly deep rich soils. In long-rotation pastures on the gum lands chicory has given good results. Seed is at the present time difficult to obtain, and most of that offered for sale is old and of poor germination.

PLOUGH FOR STUMPY GROUND.

R. J. C., Waimangaroa :—

I am thinking of trying a disk plough on country overgrown with a tough wild grass which covers here and there some old-time stumps about 3 in. deep. If you think it advisable to put a disk plough into such land kindly let me know of any good strong light plough that you could recommend for the work. I have already tried the ordinary mouldboard plough without success.

The Fields Division :—

A disk plough would probably not have much effect on the land you describe. It is more suitable for loose soils, particularly if they have been recently cultivated. A stump-jump plough would appear to be the most suitable implement to use. This can be purchased from the large implement firms.

COWS CHEWING WOOD.

"SETTLER," Waikino :—

Can you tell me what my cows want? They are always picking up wood and chewing it. I thought rock salt might stop it, but they lick the salt for a while, then leave it and pick up any wood they can get hold of and chew away at it like a bone.

The Live-stock Division :—

In some cases this unnatural action appears to be purely and simply a habit, the animals otherwise being in good health. In most cases, however, it is due to some deficiency in the food, which the animals are endeavouring to supply themselves with. This is usually the want of lime or phosphoric acid in the soil, in consequence of which the grass has not the proper chemical constituents it should have. The remedy is to top-dress the pastures with either basic slag or superphosphate. You could give your cows 1 oz. doses of compound syrup of phosphates and iron every day in a pint of water; or 1 oz. doses of precipitated phosphate of lime in a feed of bran each day. Also place rock salt in an accessible position for the cows to lick.

PROPAGATING THE POHUTUKAWA.

"HANIKAU," Waimauku :—

Kindly advise me how to propagate the pohutukawa-tree; also say whether there are two or more varieties, and which is the best and quickest-growing.

The Horticulture Division :—

The pohutukawa belongs to the family Metrosideros. There are a number of species of this family, including the tree commonly known as rata. There is but one pohutukawa—*Metrosideros tomentosa*, known also as Auckland rata. The tree can be propagated by cuttings. To do this, side shoots 4 in. or 5 in. long are taken with a heel of the old wood. The cuttings are placed close together in boxes of soil with 1 in. depth of sand on top. Water well, and place in a semi-shaded position. The time to take the cuttings is April or May, and they take nearly a year to root. The best way to propagate is by seed, which is fine as dust. Sow in autumn or early spring in boxes of sandy soil. Cover the seeds very lightly with fine soil. The young plants will be fit for transplanting into small pots or other boxes the following autumn.

GROWING THE TEA-PLANT.

H. DILLON, Masterton :—

Can you tell me whether the tea-plant has been grown, or is growing, on any Government farm or elsewhere in New Zealand ? I am trying seed of two varieties, but germination seems very slow.

The Horticulture Division :—

Tea-plants (*Camellia thea*) have been grown in New Zealand for many years, but no attempt has so far been made to grow the plant commercially. It is extremely improbable that the leaves would acquire the requisite aroma in our climate. The shrub itself is fairly hardy and will bear a few degrees of frost.

WARTS ON CALF'S FACE.

A. PARK, Ngaruawahia :—

I have a heifer calf nine months old whose nose is covered with warts. They started when the calf was three months old, and have since been spreading until they are round her eyes. Will you please say how I should deal with this affection.

The Live-stock Division :—

It is somewhat difficult to treat warts so near the eye. We would suggest that you remove as many of them as possible by snipping them off with a sharp pair of scissors ; then dab the place with caustic potash. Take no notice of the bleeding, as it will do no harm.

GRASS-SEED MIXTURE FOR MOKIHINUI DISTRICT.

THOMAS A. SMITH, Waimarie, Buller :—

As I have got bush to burn this season, will you kindly inform me what you consider the best mixture of grass-seed to sow in this district. My section is situated on the sea-coast, about six miles north of the Mokihinui River. The land is mostly granite and papa formation. The growth is heavy rata, brown-birch, rimu, and red-birch, with very thick undergrowth.

The Fields Division :—

It is difficult to grass country such as you describe with a satisfactory mixture that will remain permanent. We should advise a mixture somewhat as follows: Cocksfoot, 8 lb. ; rye-grass, 4 lb. ; crested dogstail, 2 lb. ; Chewings fescue, 6 lb. ; fiorin, 4 lb. ; *Poa pratensis*, 2 lb. ; white clover, 1 lb. ; *Lotus major*, ½ lb. It is probable that, as the section is close to the sea, danthonia would prove useful, but the sowing of this grass can follow later burning, which in all probability will have to be carried out.

SALT FOR THE GARDEN.

F. A. SILCOCK, Glentunnel :—

I should be glad of information regarding salt as a fertilizer in the garden. Can it be used in place of lime for sweetening sour soils ?

The Horticulture Division :—

Salt (chloride of sodium) is not regarded as a manure, though in some cases it may do good by acting on insoluble lime, potash, and magnesia in the soil, and so rendering them available to plants. Soil that has been long in cultivation for vegetables is considered to be benefited by salt, but probably it is more as an insecticide than as a manure. Salt is abundant in rocks and soils ; the sea gets its salt from the land, it being carried down by rivers. There may be a deficiency of salt in some places, but an authority states that there will be sufficient for cultivations within a hundred miles of the sea. Salt cannot take the place of lime.

PURCHASE OF WOOL, SHEEP-SKINS, AND HIDES BY THE IMPERIAL GOVERNMENT.

(Contributed by the Department of Imperial Government Supplies.)

II. SHEEP-SKINS.

ALL sheep-skins, except those from sheep slaughtered for export at freezing-works, are requisitioned on behalf of the Imperial Government, and it is unlawful for any person to sell or offer to sell, or purchase or offer to purchase, skins, save by way of sale to and purchase on behalf of the Crown.

Exceptions: Provision is made for the issue, by the Controller, of dealers' licenses, by which certain persons may purchase sheep-skins from farmers. Such purchases must afterwards, however, be submitted for valuation and purchase by the Government through a registered Government broker. Farmers selling skins to a dealer should in all cases insist on seeing the dealer's license. Licenses are also issued to certain individuals to purchase skins and skin-pieces which have been submitted to valuation but have been rejected by the Government skin-valuer as unsuitable for Imperial Government requirements. Such skins and skin-pieces are fellmongered by the purchaser on his own account, and the resulting slipe wool must be submitted for valuation and purchase by the Crown through a registered Government broker.

RANGE OF VALUES.

The price at which the Imperial Government agreed to purchase sheep-skins from New Zealand growers is 55 per cent. above the average prices realized in New Zealand for sheep-skins in January, 1914. The following is the scale of values per pound for skins with sound or undamaged pelts:—

	Merino.	Half-bred.	Fine Crossbred.	Coarse Crossbred.
	d.	d.	d.	d.
Three-quarter to full-wool	10½–11½	13 –14	12 –13	11½–12½
Half-wool	8¾– 9¾	11 –12	10½–11½	10 –11½
Short to quarter-wool	7½– 8½	9½–10¾	9½–10¾	8½–10¾
Shorn	5¾– 6¾	8 – 9	8½– 9½	8 –10
Lambs		11–12½		

Skins with damaged or faulty pelts are to be valued at prices proportionate to the above. Seedy skins are to be valued at lower values according to their condition. Black skins are to be valued according to their proportionate value to ordinary skins of the same class. In valuing green or salted sound-pelted skins allowance is made for the extra value of the pelts compared with dried sound skins of similar quality.

The value placed on the skins is the price at which the Government purchases the skins delivered loose to drays ex brokers' stores after valuation, all charges for store handling, salting (if necessary), weighing, classifying, cataloguing, displaying for valuation, storage for fourteen days after purchase, invoicing, &c., being paid by the seller; and for these services the broker is entitled to charge such commission or other remuneration as may be in accordance with the established custom of the trade in the locality. The cost of baling or bundling skins after valuation, and cartage from store to rail, is, however, borne by the Imperial Government.

Fourteen days after completion of purchase by valuation and invoicing payment is made, free of exchange, to the broker in whose possession the skins are held, and the broker receives and accounts for same as the agent of the seller.

VALUATION.

Valuation centres are established at the following places: Auckland, New Plymouth, Stratford, Wanganui, Feilding, Palmerston North, Gisborne, Napier,

Hastings, Dannevirke, Masterton, Wellington, Nelson, Blenheim, Christchurch, Ashburton, Timaru, Oamaru, Dunedin, Gore, and Invercargill; and the established sheep-skin brokers at each of these centres are registered Government brokers, to whom skins may be delivered for valuation and purchase.

Expert sheep-skin valuers are appointed to make the necessary valuations, and are stationed at Auckland, Napier, Wellington (two), Christchurch, Oamaru, and Dunedin, and a chief sheep-skin valuer and Inspector at Wellington.

CLASSIFICATION.

Skins are trimmed at the brokers' stores by removing shanks, cheek-pieces, and dirt, and are classified into lots according to quality and length of wool and condition of pelts. Each lot may contain skins belonging to many different owners, but each owner's skins are weighed separately before being added to the lot.

CARE OF SKINS.

A great loss to the farmers in New Zealand results through careless flaying of skins and indifferent care on the farm afterwards. The annual loss due to these causes runs into many thousands of pounds, and the great quantity of pelts which are useless after the wool has been removed and have to be destroyed is deplorable. Skins should be carefully flayed, painted while soft with an arsenical mixture as a protection from weevils, and carefully spread over rails or wires under cover to dry. Skins from sheep which have died should, if found in time, receive the same care as those from sheep slaughtered for consumption. The difference in value between a sheep-skin producing a first-grade pelt and a skin carrying a similar quantity and quality of wool but with a ruined pelt is at least 3s. per skin.

DISPOSAL OF SKINS AFTER PURCHASE.

Sheep-skins after valuation and purchase are allotted to fellmongers for treatment at contract prices under Government expert supervision. All fellmongering-works in New Zealand are engaged on Government work. The slipe wool, after being passed by the Inspectors and baled, is revalued for Imperial purposes and delivered to shipping-stores for dumping and shipment. The pelts after curing are graded into qualities (all useless pelts being discarded) and packed into casks, and after supplying the requirements of New Zealand tanners, and of the New Zealand Defence Department for jerkin leather, the balance is shipped to the Imperial Government.

SKINS FROM SHEEP SLAUGHTERED FOR EXPORT.

Sheep-skins from sheep slaughtered at freezing-works for export are not requisitioned as skins, but are fellmongered by the freezing companies on account of the owners. The resulting slipe wool is purchased on behalf of the Imperial Government at a fixed basis of prices according to quality, and the pelts are allowed to be shipped on account of the owners under certain restrictions.

III. HIDES AND CALF-SKINS.

All hides and calf-skins are requisitioned on behalf of the Imperial Government, and it is unlawful for any person to sell or offer to sell, or to purchase or offer to purchase, hides and calf-skins, save by way of sale to or purchase on behalf of the Crown.

Exceptions: Provision is made for the issue, by the Controller, of dealers' licenses, by which certain persons may purchase hides and calf-skins from farmers. Such purchases must afterwards, however, be submitted for valuation and purchase by the Government through a registered Government broker. Farmers selling hides or calf-skins to a dealer should in all cases insist on seeing the dealer's license. Licenses are also issued to certain individuals to purchase hides and calf-skins which have been submitted for valuation but have been rejected by the Government hide valuers as unsuitable for Imperial Government requirements.

Permits are issued to tanners to purchase the hides and calf-skins they require for their internal New Zealand trade from the hides, &c., which are submitted for valuation to the Government. The price to be paid by tanners is that which is placed on the hides by the Government hide-valuer in accordance with the scale of values under which purchase is made on behalf of the Imperial Government. No charge is made to tanners for valution.

RANGE OF VALUES.

The prices at which the Imperial Government agreed to purchase hides and calf-skins from New Zealand growers are the following :—

	Per Pound. s. d.
Ox-hides, first quality, over 45 lb., up to freezing companies' best standard	up to 1 1
Ox-hides, first quality, others	,, 1 0
Ox-hides, second quality	,, 0 11½
Cow-hides, first quality, up to freezing companies' best standard	,, 1 0
Cow-hides, first quality, others	,, 0 11
Cow-hides, second quality	,, 0 10½
Bull-hides, good quality	,, 0 9
Yearling-hides, first quality	,, 0 11
Calf-skins, first quality, under 8 lb.	,, 1 1
Calf-skins, first quality, 8 lb. to 11 lb.	,, 1 0
Calf-skins, first quality, over 1 lb. to 16 lb. ..	,, 0 11

All other grades and qualities, including cut, scored, and slippy hides, to be fixed at relative valuations.

The value placed on the hides is the price at which the Imperial Government purchases the hides placed f.o.b. ocean steamer in good shipping condition, all charges for store handling, trimming, salting, weighing, classifying, cataloguing, displaying for valuation, storage for twenty-eight days after purchase, invoicing, &c., bagging, branding, and placing f.o.b. being paid by the seller; and for these services the broker is entitled to charge such commission or other remuneration as may be in accordance with the established custom of the trade in the locality. The cost of storage from twenty-eight days after purchase, and insurance from date of payment, is borne by the Imperial Government.

Fourteen days after completion of purchase by valuation and invoicing payment is made, free of exchange, to the broker in whose possession the hides are held, and the broker receives and accounts for same as the agent of the seller.

VALUATION.

Valuation centres are established at the following places: Auckland, New Plymouth, Stratford, Wanganui, Feilding, Palmerston North, Gisborne, Napier, Dannevirke, Masterton, Wellington, Nelson, Blenheim, Christchurch, Timaru, Oamaru, Dunedin, Gore, and Invercargill; and the established hide-brokers at each of these centres are registered Government brokers, to whom hides may be delivered for valuation and purchase. In addition, periodical valuations are made at each freezing-works, and the public abattoirs of Christchurch, Dunedin, and Invercargill, of hides from cattle slaughtered at such freezing-works or abattoirs.

Expert hide-valuers are appointed to make the necessary valuations, and are stationed at Auckland, Wellington, and Dunedin, and an assistant hide-valuer at Christchurch.

CLASSIFICATION, ETC.

At brokers' stores hides are trimmed and freed from fat and dirt (being first washed at most freezing-works and some brokers' stores), examined for cuts and scores, and spread out in a stack with a liberal quantity of salt on each hide, where they must remain for at least fourteen days before valuation. When preparing for valuation the hides are removed from the stack, swept free of salt, and weighed, and classified according to weight, quality, and condition. Tare is allowed on hides as follows: On all hides up to the best freezing-works standard of preparation which have been properly washed before salting, 4 per cent.; on all other hides and calf-skins (per hide)—6 lb. to 16 lb., 1 lb.; 17 lb. to 32 lb., 2 lb.; 33 lb. to 69 lb., 4 lb.; 70 lb. and over, 6 lb. After valuation the hides are resalted, folded up, and bagged according to grade.

CARE OF HIDES.

Great care should be exercised in flaying. Hides should be of good shape, free from meat, and without cuts or scores, which depreciate the hides pence per pound. Too much attention cannot be given to the last, as scores which appear trivial when flaying disclose themselves as serious blemishes when the tide is tanned, and render the leather totally unfit for the purpose for which the best leather is used.

Immediately the animal-heat is out, the hides should be well salted with good clean coarse salt and folded, and should be delivered as soon as possible to a registered Government broker's store, where they can be further properly treated. Should the hide be allowed to become slippy through want of attention very serious loss results, as advantage cannot be taken of the high prices paid by the Imperial Government, such hides being unsuitable for the long voyage to the United Kingdom.

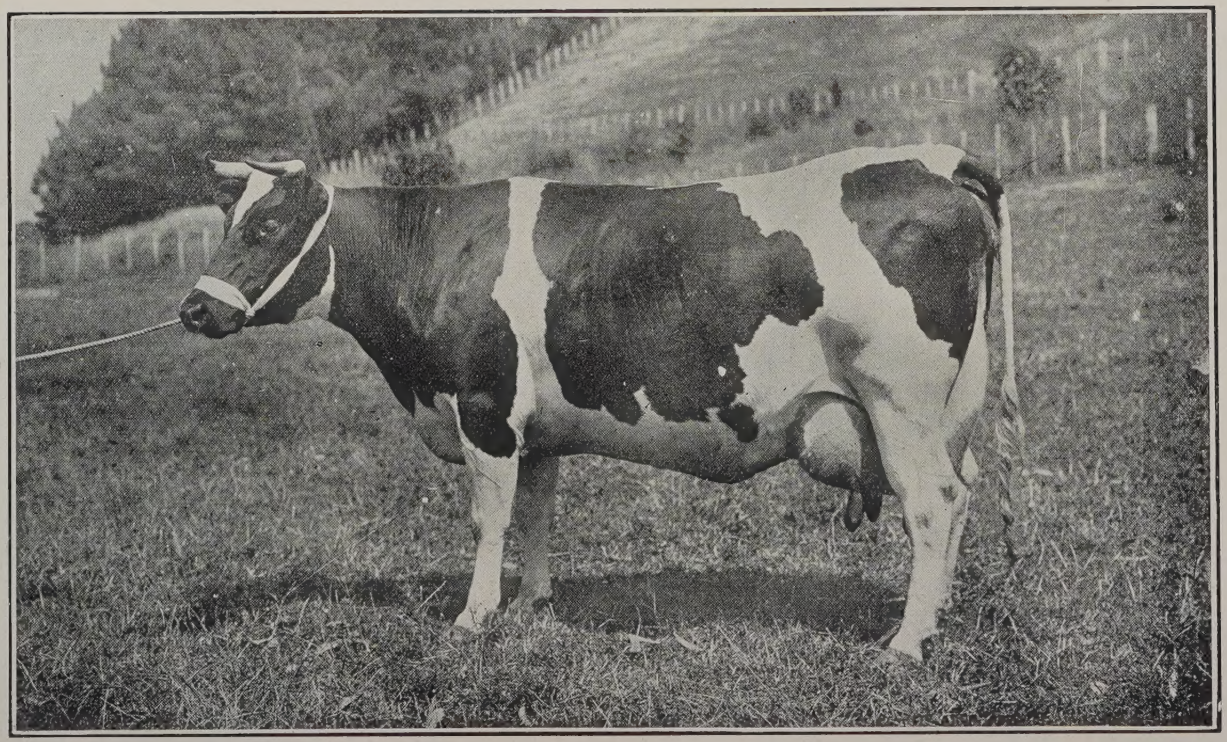
DISPOSAL OF HIDES AFTER PURCHASE.

The sacks of hides are countermarked and held by brokers or freezing companies until shipment is available. The hides have to be placed f.o.b. ocean steamer at the cost of the seller, but storage after twenty-eight days from date of purchase is paid by the Imperial Government.

FORTHCOMING AGRICULTURAL SHOWS.

Helensville A. and P. Association: At Helensville, 29th January.
Woodville A. and P. Association: At Woodville, 30th January.
Horowhenua A. and P. Association: At Levin, 30th January.
Feilding A. and P. Association: At Feilding, 5th and 6th February.
Central A. and P. Association: At Waipukurau, 6th February.
Pahiatua A. and P. Association: At Pahiatua, 8th February.
Dannevirke A. and P. Association: At Dannevirke, 13th and 14th February.
Taumarunui A. and P. Association: At Taumarunui, 13th February.
Masterton A. and P. Association: At Solway, 19th and 20th February.
Egmont A. and P. Association: At Hawera, 20th and 21st February.
Waimarino A.P.H. and I. Association: At Raetihi, 21st February.
Taranaki A. and P. Association: At New Plymouth, 27th and 28th February.
Whakatane A. and P. Association: At Taneatua, 27th February.
Hawke's Bay A. and P. Society: Autumn Show at Hastings, 6th March.
Opotiki A. and P. Association: At Opotiki, 7th March.
Rotorua A. and P. Association: At Rotorua, 13th March.
Ashburton A. and P. Association: At Ashburton, 14th March.
Temuka and Geraldine A. and P. Association: At Temuka, 14th March.
Matamata A. and P. Association: At Matamata, 21st March.
Oxford A. and P. Association: At Oxford, 4th April.
Methven A. and P. Association: At Methven, 11th April.

(A. & P. Association secretaries are invited to supply particulars of their show dates.)



WOODCREST JOHANNA TEHEE—NEW ZEALAND MILK-RECORD CHAMPION (1918).

[See page 98.